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ABSTRACT

Fifty-seven outstanding students, grades seven to nine, entered the first or second year of the Minnesota Talented Youth Mathematics Project. First year students earned credit for two years of high school algebra in one year; second year students earned high school credit for either transformational or traditional geometry and trigonometry. Classes met weekly after school for thirty weeks. The search for participants was only partially successful because fewer then one-third of the schools in the Minneapolis-St. Paul area were represented. The selection criteria, based on the School and College Ability Test (SCAT) were significant predictors of algebra achievement but not of geometry and trigonometry achievement. No sex differences in achievement were noted, but girls had a high attrition rate during and after the first year. Although no conclusions could be drawn about attitude change after several administrations of the Mathematics Attitude Inventory, there was a preliminary indication that attitude was related to future mathematics goals. In responding to the Learning Environment Inventory, a classroom climate measure, pupils viewed the program as difficult, goal-directed, and organized. First year graduates who elected not to return cited several benefits of the program: a one to two year advancement in math; the experience of challenge; and a heightened interest in math. (CP)

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Minnesota Talented Youth Mathematics Project:

Evaluation Report, 1977-78

Minnesota State Department of Education
St. Paul, Minnesota

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July 1978

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Introduction

The Minnesota Talented Youth Mathematics Project (MTYMP) was initiated in 1976 to provide three accelerated mathematics classes for extremely talented junior high school pupils. Following a successful first year, 1976-77, the project was funded for a second year during which returning pupils were offered an accelerated program in geometry and trigonometry and one class of newly selected pupils studied the first year sequence of Algebra I and Algebra II. The background and initiation of the MTYMP, together with details of the outcomes of the first year program, are reported in an earlier Evaluation Report (House, 1977). The following reports outcomes of the second year of the project.

Overview

The MTYMP is one phase of the Minnesota Component of the Multi-State Proposal for Gifted and Talented Students funded by Public Law 93:380 and administered by Lorraine Hertz, Consultant for the Gifted, Minnesota State Department of Education. The part-time project director is Steven Watson, a teacher in the St. Paul Public Schools. Originally funded at $11,716 for the first year, the program's budget for 1977-78 was cut to $11,000. Despite this decrease, however, the number of classes offered remained at three.

The original goal of the MTYMP was to accelerate the mathematics learning of extremely gifted junior high school students by providing the opportunity to complete two years of high school algebra in one year. The MTYMP classes, which met for two hour sessions once a week for thirty weeks, were designed to replicate the fast paced mathematics classes of the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University (see Stanley, Keating and Fox, 1974; Keating, 1976).

Sixty-five seventh, eighth and ninth graders completed the first year of the MTYMP. They were enrolled in three classes, two in the Twin Cities metropolitan area (MTYMP-TC 7/8 and MTYMP-TC 9) and one in Duluth (MTYMP-D). The MTYMP-TC 7/8 class consisted of 25 seventh and eighth graders; MTYMP-TC 9 enrolled 23 ninth graders; and MTYMP-D included 17 pupils of all three grade levels.

Upon receipt of funds for the second year (MTYMP II), the MTYMP Advisory Committee (see Appendix A) weighed the alternatives of offering a second year course for returning pupils or of offering up to three classes in Algebra for new groups of pupils. Based on the expressed interest to continue in the program received from almost half of the pupils, the Committee established two second year classes, one in the Twin Cities (MTYMPII-TC 2) and one in Duluth (MTYMPII-D2). One new algebra course was begun in the Twin Cities (MTYMPII-TC1).

All three of the MTYMP teachers were rehired for the MTYMPII program. Hence, no teacher searches were necessary. All three of the original teaching assistants were offered positions during the second year, and two of the three accepted. One new assistant was hired upon recommendation by the teacher. In the Twin Cities classes, the male teacher had a female assistant; the female teacher had a male assistant. In Duluth both were females. The program guidelines established by the Advisory Committee in 1976 were retained for the 1977-78 program (see Appendix B). Twin Cities classes continued to meet in facilities provided by Hamline University, St. Paul. Duluth classes were accommodated by the Duluth Public Schools.

Talent Search

Following the procedures established in 1976 (House, 1977, p. 8-9), the Second Annual Minnesota Mathematics Talent Search was held in September 1977. This second search was limited to the metropolitan Twin Cities area because the only new class was to be held there. Once again, a qualifying score at or above the 97th percentile on an in-grade standardized test of mathematical achievement or ability was required for entry in the talent search. As in the past, the test selected for the talent search was the School and College Ability Test (SCAT), Series II, Form 2A (Educational Testing Service, 1973). Both the quantitative (SCAT-Q) and verbal (SCAT-V) portions of the test were administered. Also, in accord with the findings of the earlier MTYMP evaluation (House, 1977, p. 26), the 1977 talent search was limited to seventh and eighth grade pupils only.

A total of 499 pupils participated in the second annual talent search. Although this number is down slightly from the 1976 total of 527, it must be noted that the 1976 search was open to ninth grade students also. Hence, compared to the 425 seventh and eighth graders in the first talent search, the 1977 testing attracted an additional 74 pupils, an increase of 17 percent over the comparable age group one year earlier. Table 1 shows the distribution of pupils by sex and grade.

The 499 talent search participants represented 68 schools: 51 public schools from 26 public school districts, 14 Catholic schools from the Archdiocese of St. Paul-Minneapolis, and three private schools. The numbers of pupils per school, which ranged from one to 46, are summarized in Table 2. As in 1976, announcements of the talent search were sent to the principals, counselors and mathematics department chairpersons in approximately 220 public and non public schools in the Twin Cities metropolitan area. Although more time to publicize the talent search was available in 1977, fewer schools actually participated (68 in 1977; 72 in 1976). Thus the talent search continued to reach pupils in fewer than one-third of the schools. Further, the second talent search, like the first, tended to be dominated by a few schools which account for a disproportionate number of pupils. In this case, eight schools (12 percent) sent 229 pupils (46 percent). The 28 pupils selected as a result of the testing came from 16 schools in 11 districts. The home schools of all MTYMPII pupils are given in Appendix E.

Pupil Selection

New Participants

In forming one new class, the Advisory Committee's goal was to select 25 participants via the talent search. However, because of the closeness of some scores, 28 pupils were accepted into the MTYMPII-TC 1 program. They included two seventh grade girls, six seventh grade boys, eleven eighth grade girls and nine eighth grade boys. The ratio of females to males in the class (46% to 54%) was identical to the ratio in the talent search; however, the ratio of seventh to eighth graders in the class (29% to 71%) deviated considerably from the 53% to 47% ratio in the talent search.

Based on the experience during the first year, the Advisory Committee again focused the selection process primarily on the SCAT-Q score. A minimum SCAT-Q of 43 out of a possible 50 was needed for participation. In addition, the Committee also demanded a minimum SCAT-V of 30 out of a possible 50, and pupils who did not meet the latter criterion were eliminated even if their SCAT-Q score

Table 1
MTYMPII 1977 Talent Search
Twin Cities
Participation by Individuals

	Grade 7			Grade 8			Totals		
	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total
MTYMP Participants	2	6	8	11	9	20	13	15	28
Non Participants	113	144	257	103	111	214	216	255	471
Qualified but did not accept	0	0	0	0	6	6	0	6	6
Alternates, not invited to participate	0	3	3	9	16	25	9	19	28
Non-selected	113	141	254	94	89	183	207	230	437
Totals in Talent Search	115	150	265	114	120	234	229	270	499

Table 2
MTYMPII 1977 Talent Search
Twin Cities
Participation by Schools

Number of Participants Per School	Number of Schools
1	17
2	8
3-5	15
6-10	15
11-15	5
16-20	2
21-25	2
26-30	1
31-35	0
36-40	1
41-45	1
46-50	1

exceeded 43. The first criterion was based on the demonstrated relationship between SCAT-Q and Algebra achievement reported after the first year of the MTYMP and on the similar findings reported by the SMPY. The second criterion was based on the MTYMP teachers' observations that pupils with lower verbal scores appeared to have greater difficulty keeping up with the large amount of independent work required for the course. Beyond the above two criteria, two additional decision rules were adopted by the Committee: In ranking pupils with equal scores, preference would be given first to girls over boys, and second to seventh graders over eighth graders.

Among the 499 talent search participants, the SCAT-Q scores ranged from 49 to 15; SCAT-V ranged from 43 to 6. These are displayed in Figure 1. The scores of the participants are shown in Figure 2. Once again, the SCAT test did differentiate among the highly gifted pupils in the talent search as evidenced by the scattergrams in Figures 1 and 2.

Table 3 reports the SCAT-Q scores of the MTYMPII-TC1 participants and the percentile equivalents for college bound students in the spring of ninth grade or fall of tenth grade (9S-10F). Table 4 gives similar information for selected points within the range of the SCAT-V scores of the pupils. The data in the tables are taken from the SCAT handbook.

Second Year Participants

Participants in the second year of the MTYMP was open to any student who successfully completed the Algebra I and Algebra II program. Sixty-four pupils were thus eligible: 47 in the Twin Cities and 17 in Duluth. Of these, 29 elected to return: 15 to the MTYMPII-TC2 and 14 to the MTYMPII-D2. Their descriptions by sex and grade level are contained in Tables 5 and 6. All 15 pupils in the MTYMPII-TC2 class completed the program. In Duluth, one ninth grade boy terminated the course after earning credit in geometry. In addition, one tenth grade boy who qualified for the program after the 1976 talent search but who did not attend the first year did request to join the MTYMPII-D2 and he was admitted to the class. He is not included in the numbers shown in Table 6.

Predicting Success in the MTYMP

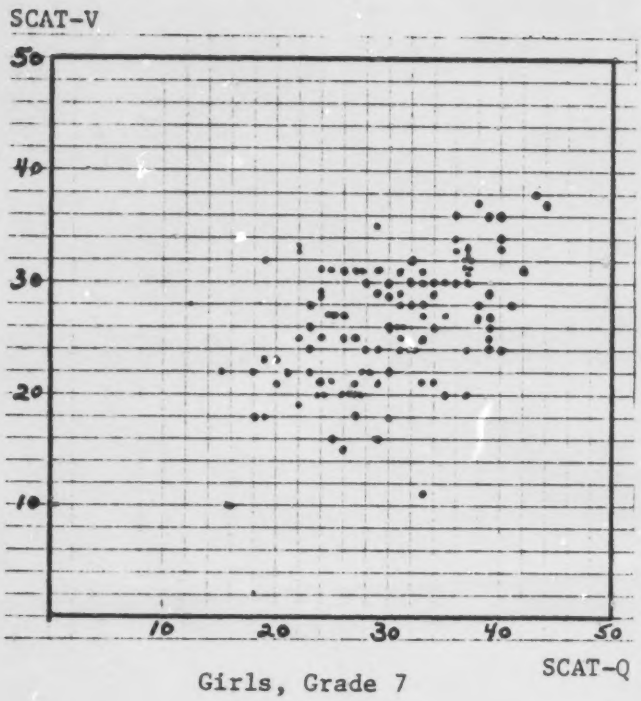
In the first MTYMP evaluation report, attention was directed to the question of how well the selection criteria predicted success in the program. One principal measure of success in the MTYMP has been the pupil's performance on standardized achievement tests which are used in the program as criteria for the granting of credit by the home school. The tests selected for this purpose are the Cooperative Mathematics Tests (COOP) (Educational Testing Service, 1964). For the first year classes two COOP tests are used: Algebra I (COOP-I) and Algebra II (COOP-II).

As reported in the first year's evaluation (House, 1977, pp. 16-24), a multiple regression analysis was performed to examine the relationship between the pupil's score on the SCAT test and achievement as measured by the scores on the COOP-I and COOP-II.

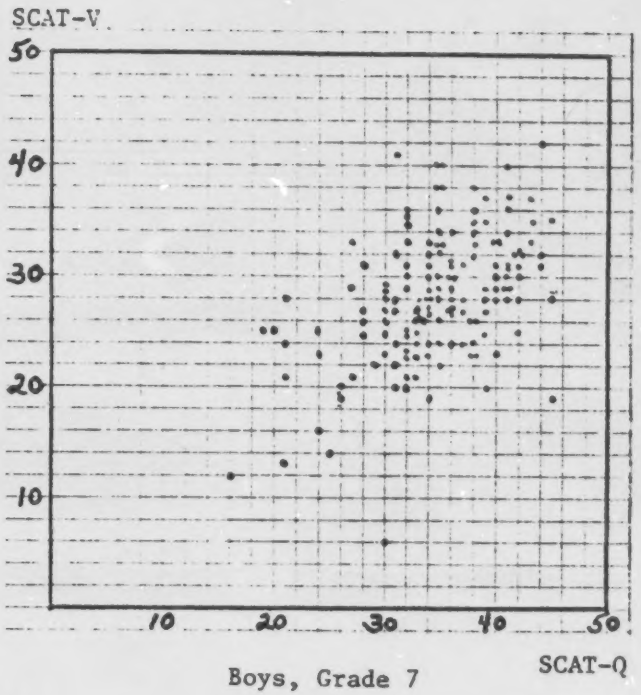
The findings suggested a significant relationship between mathematical ability as measured by the SCAT-Q and success in Algebra. To further verify that initial result, the analysis was repeated for the 25 pupils who completed the MTYMPII-TC1 program.

Figure 1

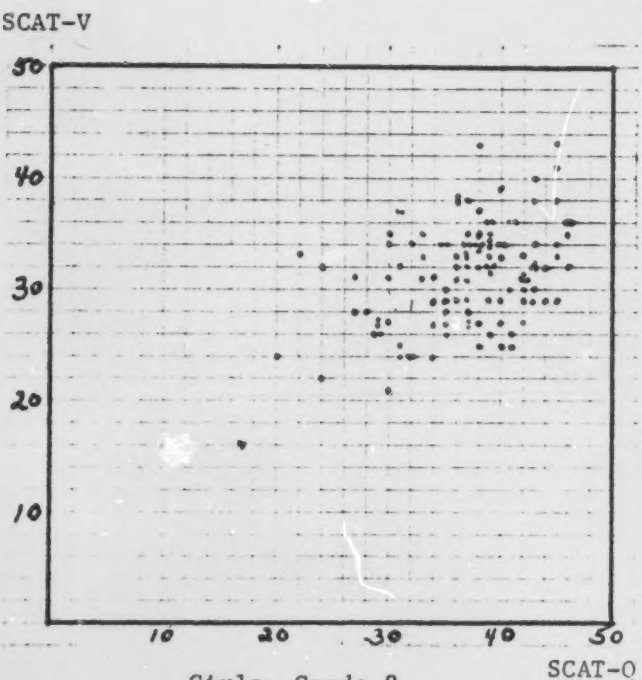
SCAT Scores of 1977 Talent Search Participants



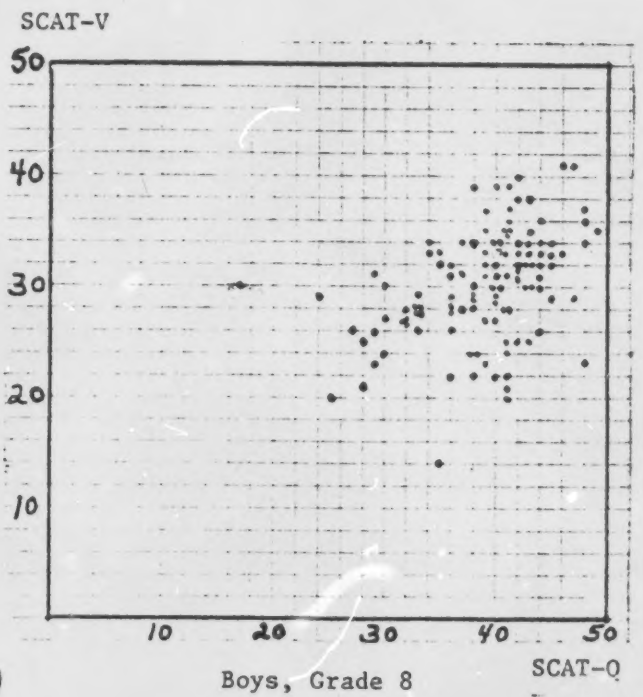
Girls, Grade 7



Boys, Grade 7

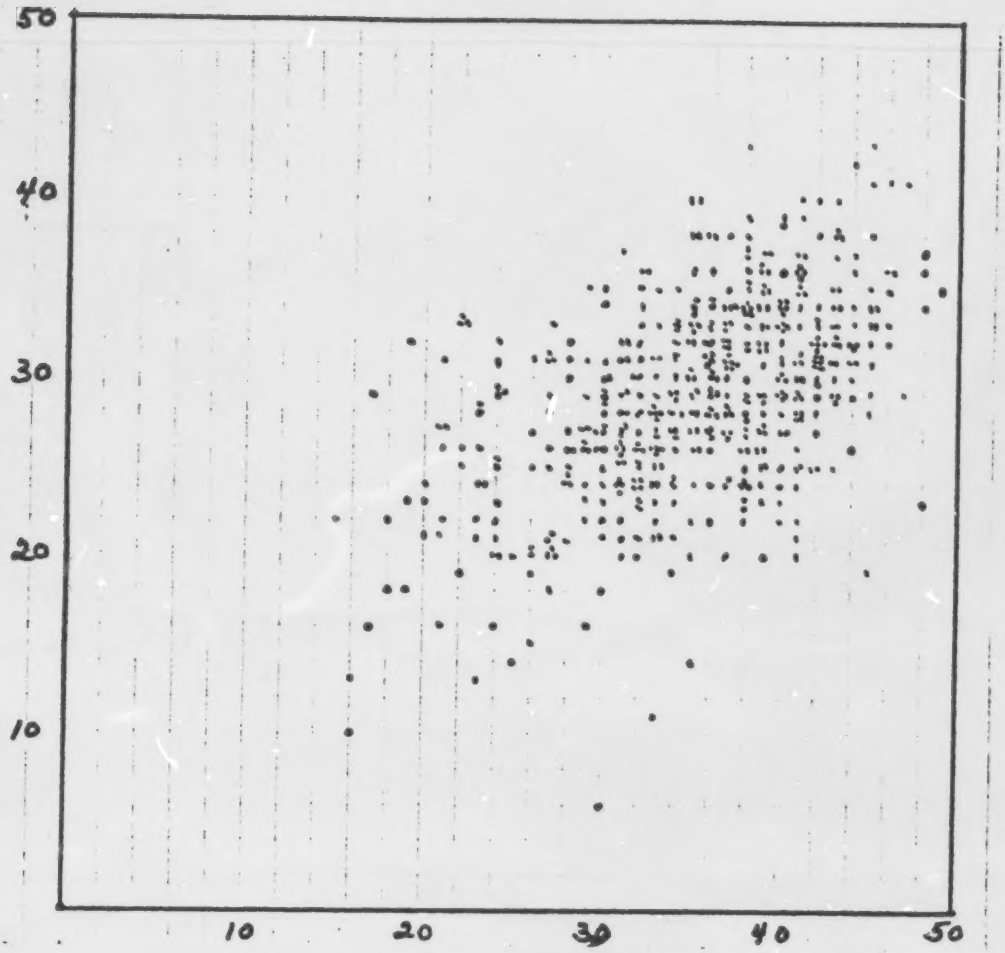


Girls, Grade 8



Boys, Grade 8

Figure 1 (Cont.)



All 1977 Talent Search Participants

Figure 2

SCAT Scores of Pupils Selected in 1977

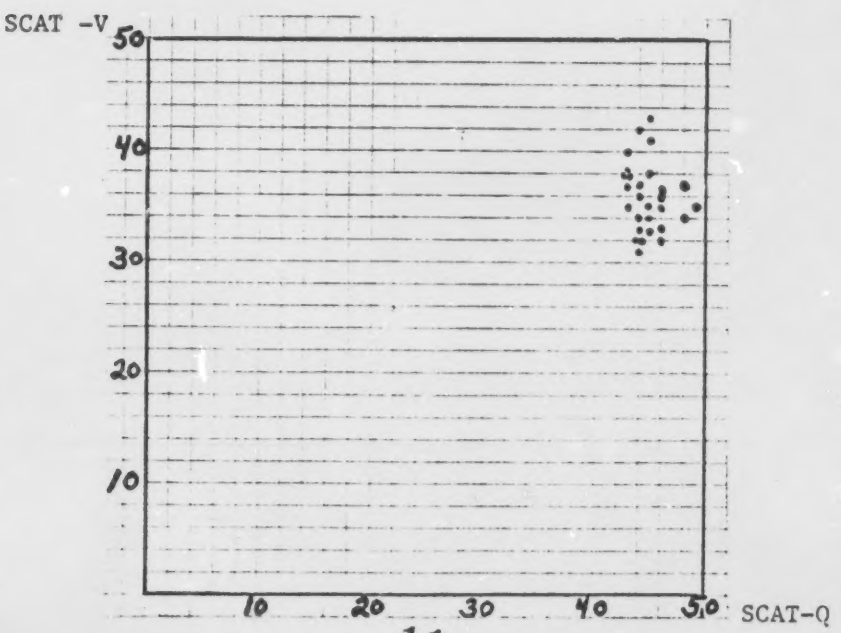


Table 3
Individual SCAT-Q Norms for College Bound Students
Grades 9S-10F
and Scores Earned by MTYMP Students

Scores		Percentile	Percentile	Number of
Raw	Converted	Band	Mean	MTYMPII-TC1 Scores*
49	510	99-99+	99+	1
48	507	99-99+	99+	2
47	505	98-99+	99+	0
46	503	98-99+	99	5
45	500	95-99	98	6
44	498	92-98	96	8
43	496	88-98	94	6

*Number of MTYMP students earning the given score.

Table 4
Individual SCAT-V Norms for College Bound Students
Grades 9S-10F
and Scores Earned by MTYMP Students

Scores		Percentile	Percentile	MTYMPII-TC1 Scores--
Raw	Converted	Band	Mean	Cummulative Frequency*
45	489	99-99+	99+	0
40	481	89-98	95	4
35	471	64-87	77	18
30	461	37-64	50	28

*Number of MTYMP students earning the given score or higher.

Table 5

Descriptions of Pupils Completing MTYMP, 1976-77

	Twin Cities				Duluth			
Grade:	7	8	9	Total	7	8	9	Total
Girls	2	4	6	12	0	2	1	3
Boys	6	12	17	35	3	10	1	14
Total	8	16	23	47	3	12	2	17

Table 6

Descriptions of Pupils Returning to MTYMP, 1977-78

	Twin Cities				Duluth			
Grade:	8	9	10	Total	8	9	10	Total
Girls	1	0	1	2	0	2	1	3
Boys	2	5	6	13	3	6	1	10
Total	3	5	7	15	3	8	2	13

Again a multiple regression analysis was performed. This technique uses two or more variables to predict the value of a single criterion. In the present case, the variables used as predictors were the SCAT-Q and SCAT-V scores and the sex of the student. The criterion to be predicted was achievement in Algebra I and II as measured by the COOP score. For each class, the analysis was first performed using the COOP-I score, then repeated for the COOP-II.

The multiple regression analysis proceeded as follows: First, the three predictor variables were used to generate a regression equation of the form

$$Y = b_1X_1 + b_2X_2 + b_3X_3 + c$$

and the regression cooefficients (b_1, b_2, b_3) and constant (c) were determined. This equation is referred to as the full model equation. Next, the F-statistic was calculated for the hypothesis of no relationship for the full model equation, and the F value was tested for significance. A determination that F is significant indicates that the three predictor equation can be used to predict algebra achievement as measured by scores on COOP-I or COOP-II.

After the full model equation was determined, a new equation, called the restricted model, was formed using as predictors only one or two or the variables which appeared to weigh heaviest in the full model. Again, the F-statistic for the hypothesis of no relationship was calculated and tested for significance. Also, the F-statistic was calculated for the hypothesis of no difference between the full model and the restricted model, and the F was tested for significance. A determination of non-significance indicates that the full model does not predict significantly better than the restricted model, and suggests that the variables in the restricted model alone can be used as predictors of achievement.

Finally, the multiple R and R^2 were calculated for each case. The R value is the multiple correlation coefficient, and R^2 represents the proportion of the variance of the dependent variable, in this case achievement in algebra as measured on the COOP test, which is accounted for by the predictor variables.

The results shown in Table 7 are consistent with the previous findings. They indicate that the SCAT-Q score was a significant predictor ($p < .01$) of success in Algebra II; that the combination of SCAT-Q, SCAT-V and sex did not predict significantly better than SCAT-Q alone; and that none of the prediction equations reached significance for the Algebra I criterion. Hence, the use of the SCAT-Q score as the principal selection criterion continues to appear to be the appropriate descision. The correlations among the above variables are shown in Table 8.

In addition to the COOP test scores, however, achievement in the program is measured by regular quizzes, unit tests, homework and class participation. At the end of the 1977-78 school year, the teacher of the MTYMPII-TC1 class determined two sets of pupil rankings: test rank based on unit tests and overall rank based on the combination of homework, unit tests, COOP tests, quizzes and other assignments. Comparisons of these two ranking with the pupils' SCAT-Q and SCAT-V scores can be made using the Spearman rank correlation coefficient. These correlations are reported in Table 9. The significant correlations between SCAT-V scores and achievement as measured by teacher's ranking lends support to the teachers' earlier observations that pupils with low verbal scores experienced greater difficulty. Further, this result strengthens the Committee's decision to establish a minimum SCAT-V criterion.

Table 7
Multiple Regression Analysis for MTYMPII-TC1
Using SCAT-Q, SCAT-V and Sex

	Full Model	Restricted Models			Full Model	Restricted Models		
Predictors: (Regression coefficients in parentheses)	SCAT-Q (0.04) SCAT-V (0.16) Sex (-0.77) (C = 78.93)	SCAT-Q SCAT-V	SCAT-Q Sex	SCAT-V Sex	SCAT-Q (0.69) SCAT-V (0.12) Sex (-0.90) (C = -231.14)	SCAT-Q SCAT-V	SCAT-Q Sex	SCAT-Q
Criterion:	COOP-I	COOP-I	COOP-I	COOP-I	COOP-II	COOP-II	COOP-II	COOP-II
N:	25	25	25	25	25	25	25	25
R:	0.33	0.30	0.04	0.32	0.56	0.55	0.54	0.54
R^2:	0.11	0.09	0.00	0.11	0.32	0.31	0.29	0.29
Test of no relation:								
F:	0.84	1.10	0.01	1.22	3.26	4.89	3.77	9.46
df:	(3,21)	(2,22)	(2,22)	(2,22)	(3,21)	(2,22)	(2,22)	(1,23)
Significance:	none	none	none	none	$p < .05$	$p < .05$	$p < .05$	$p < .01$
Test of no difference:								
F:						vs. Full	vs. Full	vs. Full
df:						0.30	0.77	0.41
Significance:						(1.21)	(1,21)	(2,21)
						none	none	none

Table 8

Correlation Coefficients
MTYMPII-TC1 Class

	Sex*	Grade**	SCAT-Q	SCAT-V	COOP-I	COOP-II
Sex*	1.00					
Grade**	0.33	1.00				
SCAT-Q	-0.12	0.38	1.00			
SCAT-V	0.30	0.03	-0.16	1.00		
COOP-I	-0.03	-0.19	0.13	0.30	1.00	
COOP-II	-0.11	0.28	0.44[1]	-0.01	0.32	1.00

* Positive correlations favor females
** Positive correlations favor eighth graders

1 $p < .05$

Table 9

Spearman Rank Correlation Coefficients
MTYMPII-TC1 Class

	SCAT-Q	SCAT-V	Test Rank	Overall Rank
SCAT-Q	1.00			
SCAT-V	-0.202	1.00		
Test Rank	0.237	0.392[1]	1.00	
Overall Rank	0.146	0.365[1]	0.913[2]	1.00

1 $p < .05$
2 $p < .01$

Females in the MTYMP

An ongoing concern since the establishment of the MTYMP has been to attract qualified girls into the program. As noted earlier, 46 percent of the talent search participants were female, and this exactly matched their proportion (13 of 28) in the class. However, three pupils who dropped the course during the first or second trimester all were female. Hence, only 10 of 25 pupils completing the program were girls. Additional sex differences in attitudes and future plans also were noted, and these are reported in appropriate sections throughout the remainder of this report.

Mathematics Achievement

As indicated earlier, the first year curriculum for the MTYMP consists of Algebra I and Algebra II. These are taught in an integrated fashion, and the topics covered in the course are listed in Figure 3. The texts selected were the Scott, Foresman Algebra One and Algebra Two (1976, 1977), the same texts used during the first MTYMP. The second year course, offered for the first time in the MTYMPII, was a program of plane geometry, analytical geometry and trigonometry. The curriculum topics are given in Figure 4. The texts used for these classes were the Laidlaw Geometry: A Transformational Approach (1971), used by the MTYMPII-TC2, and the Random House Geometry (1975), used in MTYMPII-D2.

Algebra Achievement

Instruction in Algebra I and II, as outlined in the curriculum topics shown in Figure 3, proceeded in an integrated fashion. Within the first two weeks of the class the pupils were given a pretest of algebra achievement using the COOP-I, Form A, and a diagnostic test using the Minneapolis Public Schools Minimum Essentials Test -- Elementary Algebra, Semester I. This latter instrument was scored by the teacher and teaching assistant and used by them to identify topics needing attention early in the program. Because the MTYMP pupils have generally strong mathematics backgrounds, many introductory topics need only brief treatment. The diagnostic test served as an important guide to instruction at the onset of the course.

For the purpose of determining course credit, however, the Advisory Committee has specified that students must score at or above the 88th percentile on the national norms for the COOP test. For both Algebra I and Algebra II this was a score of 30 out of a possible 40. These standards are reported in Tables 10 and 11. The data are from the COOP handbook. In all, MTYMPII-TC1 pupils took four COOP tests as follows:

October 6, 1977	COOP	Algebra I, Form A (Pretest)
January 19, 1978	COOP	Algebra II, Form A (Pretest)
March 16, 1978	COOP	Algebra I, Form B (Criterion)
May 25, 1978	COOP	Algebra II, Form B (Criterion)

In keeping with Advisory Committee policy, pupils who do not reach the 88 percentile criterion are permitted to take a retest using a parallel form of the respective test. For the MTYMPII-TC1 class, all attained the criterion on the COOP-I; two pupils who scored 29 on the COOP-II were retested and attained scores of 33 and 36 on Form A of the COOP-II. Thus, all 25 who completed the program earned credit in both Algebra I and Algebra II. Figures 5 and 6 show the distribution of scores on the pre and posttests of Algebra I and II. All of the COOP-I

Figure 3

MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT (MTYMP)
ALGEBRA I AND II
CURRICULUM TOPICS - September 1977-June 1978

First 10 weeks

1. Simplifying algebraic expressions
2. Solving linear equations with one variable
3. Solving linear inequalities with one variable
4. Simplifying polynomial expressions
5. Multiplying binomials
6. Factoring polynomials
7. Solving quadration equations without use of quadratic formula
8. Graphing lines from equations, two points, and slope-intercept methods
9. Finding equations from graphs, two points, and slope-intercept methods

Second 10 weeks

10. Solving absolute value relationships with one or two variables
11. Solving two equations in two variables by substitution, addition, and graphing
12. Solving three equations in three variables by substitution and matrices
13. Solving two equations in three variables
14. Solving systems of linear inequalities by graphing and finding the extreme points
15. The Pythagorean Theorem
16. Operations involving squares, radicals, square roots and simplifying
17. Solving equations by factoring, completing the square and the quadratic formula
18. Graphing and transforming quadratic functions of the form $f(x)=a(x - h)^2 + k$
19. Using the distance formula
20. Solving and graphing equations of conic sections
21. Operations with complex numbers
22. Solving ratio, proportion, and rational expression problems
23. Scientific notation, exponential and logarithmic functions

Last 10 weeks

24. Operations with rational fractions
25. Properties of 30-60 right triangle
26. Related angles
27. Areas of general triangles
28. Properties and graphs of trigonometric functions
29. Trigonometric equations and identities
30. Radian measure and arc length
31. Half-angle, double angle formula
32. Law of Cosines and Law of Sines
33. Arithmetric and Geometric sequences
34. Sums of arithmetic series
35. Halving and doubling at times of sequence

Figure 4

MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT
1977-78

PLANE GEOMETRY, ANALYTICAL GEOMETRY, AND TRIGONOMETRY
COURSE OF STUDY

From plane geometry, analytical geometry and trigonometry the following curriculum topics have been covered from September 29, 1977 through May 25, 1978.

First 10 weeks

1. Introduction to Vectors
2. Points, Lines, and Planes
3. Angles and Segments
4. Reflections
5. Transformations
6. Proof and Logic; Two Column Proofs
7. Symmetric Figures
8. Indirect Proof
9. Proof by Induction
10. Parallel Postulate
11. Historical Topics
12. Regular Polygons
13. Parallel Lines
14. Congruent Triangles
15. Constructions
16. Applications of Congruent Triangles

Second 10 weeks

17. Applications of Similarity
18. Size Transformation and Similarity
19. Circles and Triangles
20. Coordinate Geometry
21. Area, Volume, and Perimeter
22. Composition and Inverse of Functions
23. Periodic Functions
24. Circular Functions and Their Graphs
25. Properties and Circular Functions
26. Identities and Formulas
27. Inverse of Periodic Functions

Third 10 weeks

28. Solution of Triangles
29. Vectors
30. Polar Coordinates
31. Complex Numbers
32. De Moivre's Theorem
33. Matrices
34. Introduction to Spherical Trigonometry
35. Infinite Series and Limits

Table 10

National Norms: COOP Algebra I

Raw Score		Converted	Eighth Grade Norms		Ninth Grade Norms	
Form A	Form B	Score	Percentile Band	Mid	Percentile Band	Mid
	40	177				
40		176				
	39	175	99-99.9	99.8		
39	38	174	99-99.9	99.8		
38	37	173	97-99.9	99.4	97-99.9	99.6
37		172	97-99.9	99.4	97-99.9	99.6
	36	171	95-99.8	99	96-99.9	99.2
36	35	170	95-99.8	99	96-99.9	99.2
35	34	169	90-99.4	97	93-99.6	97
		168	90-99.4	97	93-99.6	97
34	33	167	87-99	95	89-99.2	96
33	32	166	87-99	95	89-99.2	96
32		165	83-97	90	87-97	93
	31	164	83-97	90	87-97	93
31	30	163	73-95	87	79-96	89
30	29	162	73-95	87	79-96	89
Mean			152		150	
Standard Deviation			9		10	
75 percentile			159		157	
50 percentile			153		150	
25 percentile			146		144	
SCAT-Q Mean			306		301	
SCAT-Q S.D.			13		15	

Table 11

National Norms: COOP Algebra II

Raw Score		Converted	National Norms	
Form A	Form B	Score	Percentile Band	Mid
40	40	177		
		176		
39	39	175	98-99.9	99.7
38	38	174	98-99.9	99.7
	37	173	97-99.9	99.2
37		172	97-99.9	99.2
36	36	171	95-99.7	98
35	35	170	95-99.7	98
	34	169	93-99.2	97
34		168	93-99.2	97
33	33	167	88-98	95
32	32	166	88-98	95
	31	165	85-97	93
31		164	85-97	93
30	30	163	79-95	88
	29	162	79-95	88

Mean	150
Standard Deviation	10
75 percentile	157
50 percentile	150
25 percentile	143
SCAT-Q Mean	309
SCAT-Q S.D.	15

Figure 5

COOP-I Test Results, MTYMPII-TC1 Class

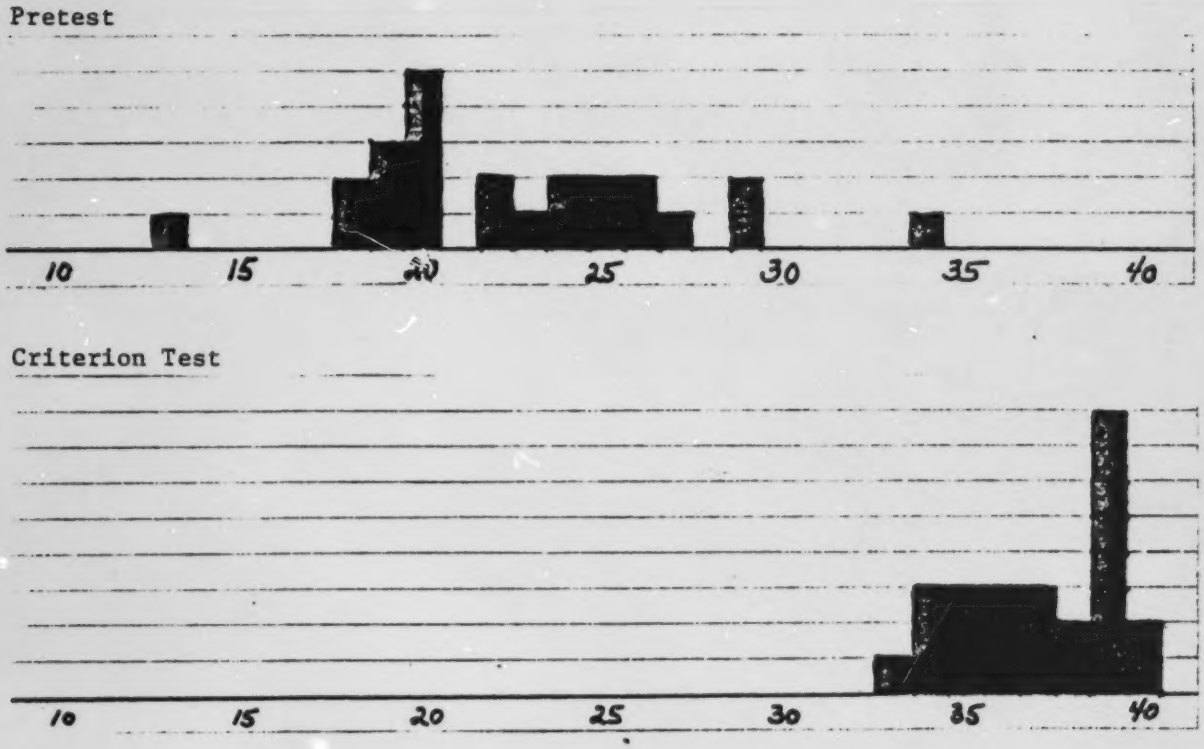
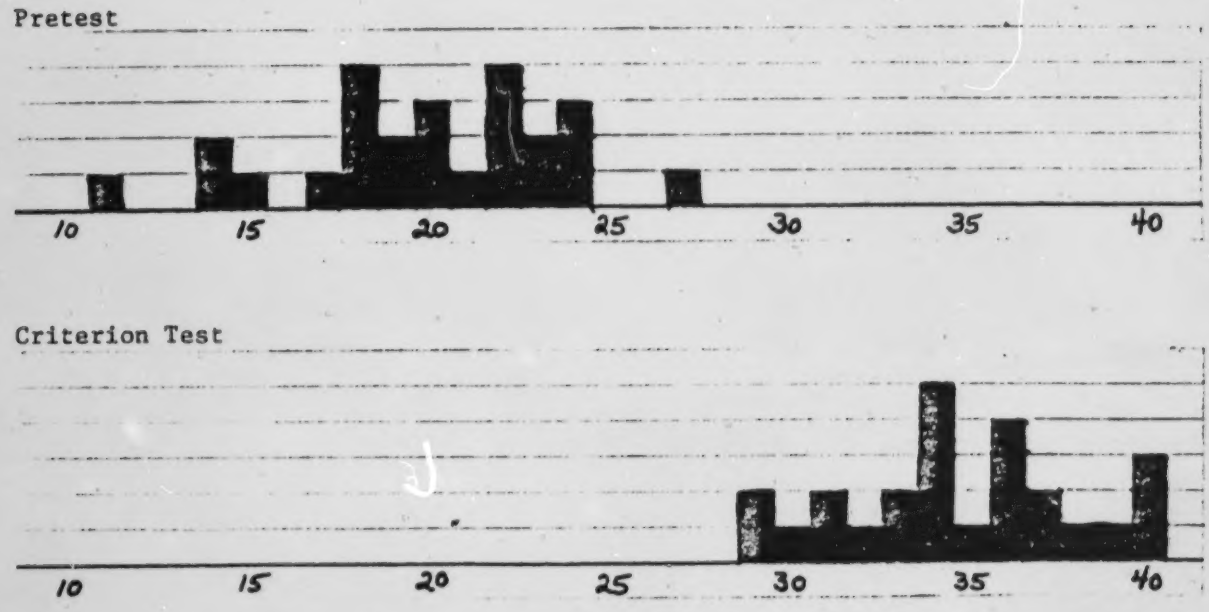


Figure 6

COOP-II Test Results, MTYMPII-TC1 Class



were above the 95th percentile, and 84 percent were in the 99th percentile range; all the COOP-II scores attained the 88th percentile, with 80 percent of these at the 95th percentile or above.

Table 12 compares pupil performance on the algebra pre and post-tests for the MTYMPII-TC1 pupils. (All analyses reported here use scores on the original criterion tests only.) A comparison using the t-test for two related samples and a one-tail test of significance showed highly significant gains ($p < .0005$) on both Algebra I and Algebra II measures. These findings correspond to the achievement reported in the first year of the MTYMP. There is no doubt that the achievement goals of the algebra program are being met by both girls and boys.

A final measure of pupil achievement is reflected by the grades earned in the course. Pupils in the MTYMP receive written progress reports at the end of each trimester (see Appendix D), and they receive grades in each course for which credit is earned. These grades are determined on the basis of pupil performance on quizzes, unit tests, COOP tests, homework and classroom activities. The grades earned by the MTYMPII are reported in Table 13. The grade distribution suggests that all three teachers maintain rigorous standards for pupil performance and that students must work to attain high grades.

Geometry, Trigonometry Achievement

While the curriculum content of the MTYMPII second year classes was the same for both groups (see Figure 4), the instructional approach used in the two classes differed. The MTYMPII-TC2 class studied geometry using a transformational approach, while MTYMPII-D2 pupils used a more traditional method. Both classes were assessed using the same criterion instrument, however. This was the COOP Geometry (COOP-G), a test consisting of two parts each containing 40 items. Both Parts I and II were administered, and mastery was measured in terms of the total score on the two parts. The norms for this test, taken from the COOP Handbook, are given in Table 14. A total score of 54 on Form B was the minimum for the 88th percentile criterion.

The geometry classes were given pre and post assessments according to the following schedule:

MTYMPII-TC2

October 6, 1977	COOP Geometry, Form A	(Pretest)
March 2, 1978	COOP Geometry, Form B	(Criterion)

MTYMPII-D2

October 18, 1977	COOP Geometry, Form A	(Pretest)
February 7, 1978	COOP Geometry, Form B	(Criterion)

Student performances on these tests are reported in Figures 7 and 8. All fifteen of the MTYMPII-TC2 pupils attained the 93rd percentile or above on the COOP-G criterion test. Thirteen of the fourteen MTYMPII-D2 scored at the 93rd percentile or higher on the same test. One pupil who originally earned a score of 50 (80th percentile) later attained a 68 (99th percentile) on a retest using COOP-G, Form A. Thus all recieved credit in Geometry.

Note should be taken of the fact that both classes were highly successful in their performance on the COOP-G despite the differences in the instructional approach and test used. In particular, the MTYMPII-TC2 class which studied

Table 12

Algebra Achievement of MTYMPII-TC1 Students

	COOP-I			COOP-II		
	Girls	Boys	All	Girls	Boys	All
Pretest Mean	151.0	151.6	151.4	148.0	149.5	148.9
Posttest Mean	172.6	172.6	172.6	169.0	170.1	169.7
Mean Gain	21.6	21.0	21.2	21.0	20.6	20.8
N	10	14*	24	10	15	25
t			17.5			19.3
degrees of freedom			23			24
Significance (one tail test)			$p < .0005$			$p < .0005$

All scores are converted scores. Data are for the 25 pupils who completed the course.

*Pretest score was unavailable for one pupil.

Table 13

Grades Earned by MTYMPII Pupils

Class	Grade	First Trimester	Second Trimester	Final Grade	
				Algebra I	Algebra II
MTYMPII-TC1	A	10	10	10	9
	A-	3	4	5	6
	B+	4	4	6	2
	B	5	5	1	4
	B-	2	1	2	2
	C+		1	1	1
	C	1			1
				Geometry	Trigonometry
MTYMPII-TC2	A+		1		
	A	12	11	13	12
	A-	1	1		
	B+				1
	B	1			
	B-			1	
	C+		1		1
	C		1	1	1
	C-	1			
				Geometry	Trigonometry	Analytic Geometry
MTYMPII-D2	A			9	9	11
	B			5	4	2

Grades are based on total performance: unit tests, quizzes, mastery tests, homework, class participation.

Table 14

National Norms: COOP Geometry, Parts I and II

Raw Score		Converted		
Form A	Form B	Score	Percentile Band	Mid
80		189		
79		188		
78		187		
77		186		
76		185		
75	80	184		
74	79	183		
73	77-78	182		
71-72	76	181	99.5-99.9	99.9
70	75	180	99.5-99.9	99.9
69	74	179	99.2-99.9	99.7
68	73	178	99.2-99.9	99.7
67	71-72	177	99-99.9	99.5
66	70	176	99-99.9	99.5
65	69	175	98-99.7	99.2
64	68	174	98-99.7	99.2
63	67	173	97-99.5	99
62	66	172	97-99.5	99
61	64-65	171	95-99.2	98
60	63	170	95-99.2	98
59	62	169	93-99	97
58	61	168	93-99	97
57	60	167	89-98	95
56	58-59	166	89-98	95
55	57	165	85-97	93
54	56	164	85-97	93
53	55	163	80-95	89
52	54	162	80-95	89

Mean	150
Standard Deviation	10
75 percentile	156
50 percentile	150
25 percentile	144
SCAT-Q Mean	303
SCAT-Q S.D.	14

Figure 7

COOP-G Test Results, MTYMPII-TC2 Class

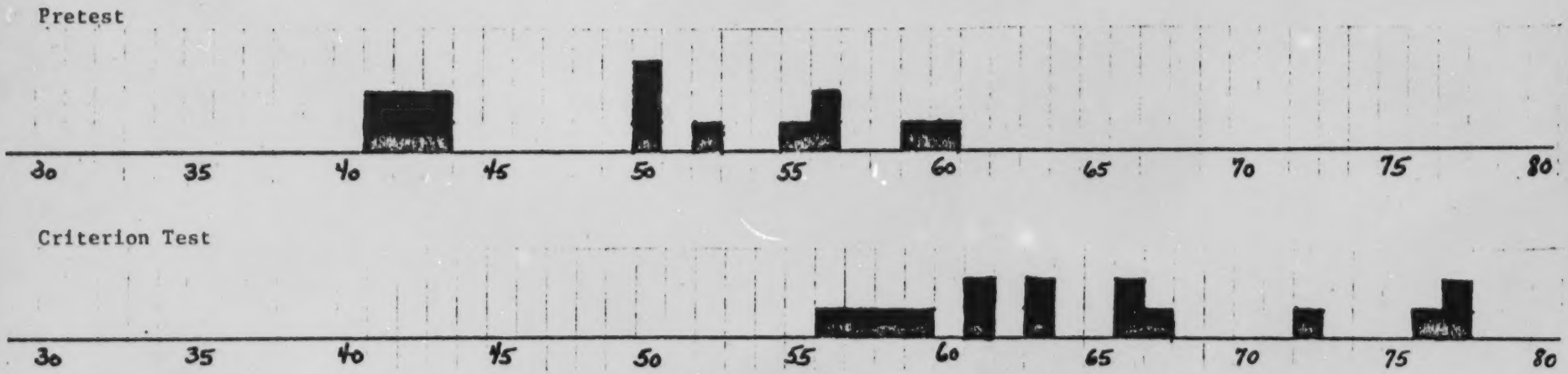
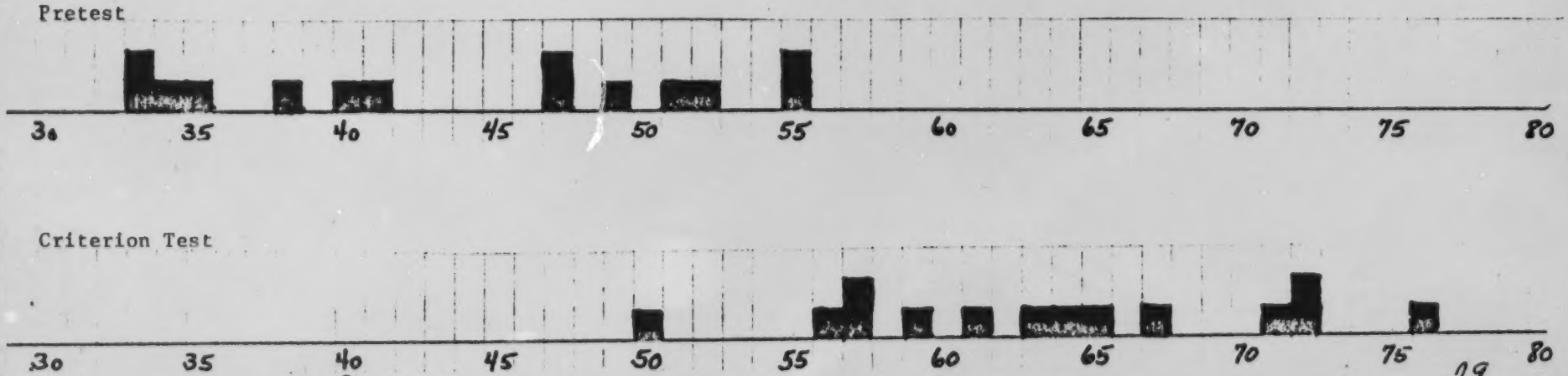


Figure 8

COOP-G Test Results, MTYMPII-D2 Class



geometry using a transformational approach nevertheless surpassed the mastery criterion on a traditional geometry examination.

Pre and posttest performances were analyzed using the t-test for related samples and a one-tail test of significance. As in the algebra classes, achievement gains in geometry were highly significant ($p < .0005$). These results are shown in Table 15.

In addition to the geometry, pupils in the second year course also studied trigonometry and analytic geometry. These topics were integrated with the geometry and are included in the curriculum outlined in Figure 4. Both classes took a mastery test for trigonometry (COOP-T) and pupils received high school credit for trigonometry based on the usual 88th percentile criterion. Only one Duluth student terminated after geometry. All others earned credit in both geometry and trigonometry.

The MTYMPII-D2 class took pre and posttests in both trigonometry and analytic geometry, and these pupils were assigned separate grades in the two subjects (see Table 13). Pupils on the MTYMPII-TC2 section took a trigonometry criterion examination only and received grades for trigonometry (Table 13). The test schedule in these two subjects was as follows:

MTYMPII-TC2		
	May 25, 1978	COOP Trigonometry, Form A (Criterion)
MTYMPII-D2		
	February 21, 1978	COOP Trigonometry, Form A (Pretest)
	May 9, 1978	COOP Trigonometry, Form B (Criterion)
	May 9, 1978	COOP Analytic Geometry, Form A (Pretest)
	May 30, 1978	COOP Analytic Geometry, Form B (Criterion)

Tables 16 and 17 show norms for the above tests. The COOP-T required 22 of 40 items on Form A or 24 of 40 items on Form B for the mastery level (88th percentile). Twelve of the thirteen MTYMPII-D2 and thirteen of the fifteen MTYMPII-TC2 pupils attained the required levels. The three who initially did not all later surpassed the 90th percentile on the retest. The Analytic Geometry (COOP-AG) test consisted of only 35 items; a score of 26 was necessary for the 88th percentile. Again, twelve of the thirteen MTYMPII-D2 pupils who took the test surpassed the criterion; the one who was retested did later perform beyond the criterion (95th percentile) on the equivalent test. The results of these tests are displayed in Figures 9 through 11.

For the Duluth class it is also possible to compare pre and posttest performances on the COOP-T and COOP-AG. These are shown in Table 18. The t-test for related samples with a one-tail test of significance again showed gains to be significant beyond the $p < .0005$ level in both subjects. As with all other areas of the MTYMP curriculum, content goals in trigonometry and analytic geometry were being met with considerable success.

For those pupils completing two years in the MTYMP, correlations were drawn between their scores on the 1976 SCAT test, their first year performance in Algebra I and II, and their achievement in the second year subjects. These are reported in Tables 19 and 20. (One Duluth pupil qualified to join the MTYMPII but had not participated in the first year course. His scores were eliminated because of the lack of COOP-I and COOP-II data.)

Table 15

Geometry Achievement of MTYMPII Students

	MTYMPII-TC2	MTYMPII-D2
Pretest Mean	159.3	153.6
Posttest Mean	171.7	170.3
Mean Gain	12.4	16.7
N	15	14
t	9.87	12.35
degrees of freedom	14	13
Significance (one tail test)	$p < .0005$	$p < .0005$

All scores are converted scores.

Table 16

National Norms: Coop Trigonometry

Raw Score		Converted		
Form A	Form B	Score	Percentile Band	Mid
40		191		
39		190		
		189		
38		188		
37		187	99.0-99.9	99.7
	40	186	99.0-99.9	99.7
36	39	185	99-99.9	99.7
		184	99-99.9	99.7
35	38	183	99-99.7	99.5
34	37	182	99-99.7	99.5
		181	98-99.7	99.0
33	36	180	98-99.7	99.0
	35	179	98-99.7	99
32		178	98-99.7	99
31	34	177	97-99.0	98
	33	176	97-99.0	98
30		175	96-99	98
	32	174	96-99	98
29	31	173	94-99	97
28		172	94-99	97
	30	171	93-98	97
27	29	170	93-98	97
		169	91-98	96
26	28	168	91-98	96
25	27	167	86-97	93
		166	86-97	93
24	26	165	83-96	91
	25	164	83-96	91
23	24	163	79-94	89
22		162	79-94	89

Mean	150
Standard Deviation	10
75 percentile	156
50 percentile	148
25 percentile	143
SCAT-Q Mean	316
SCAT-Q S.D.	15

Table 17

National Norms: COOP Analytic Geometry

Raw Score		Converted		
Form A	Form B	Score	Percentile Band	Mid
	35	185		
		184		
35	34	183	96-99.9	99.5
		182	96-99.9	99.5
34	33	181	95-99.9	99
33		180	95-99.9	99
	32	179	95-99.9	98
32		178	95-99.9	98
	31	177	92-99.5	96
31		176	92-99.5	96
	30	175	92-98	95
30		174	92-98	95
	29	173	90-96	95
29		172	90-96	95
	28	171	86-95	92
28		170	86-95	92
	27	169	79-95	92
27		168	79-95	92
	26	167	74-92	90
26		166	74-92	90

Mean	154
Standard Deviation	11
75 percentile	162
50 percentile	154
25 percentile	147
SCAT-Q Mean	326
SCAT-Q S.D.	9

Figure 9

COOP-T Test Results, MTYMPII-TC2 Class

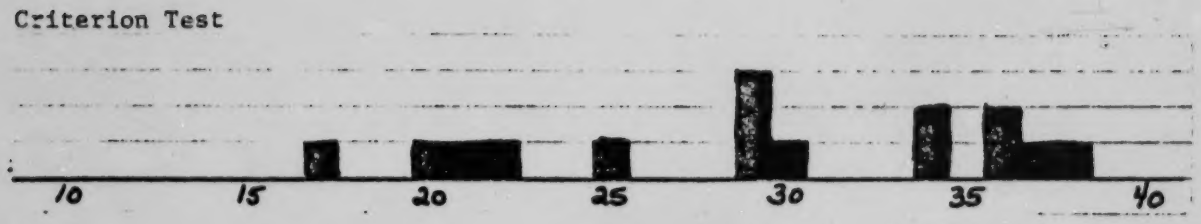


Figure 10

COOP-T Test Results, MTYMPII-D2 Class

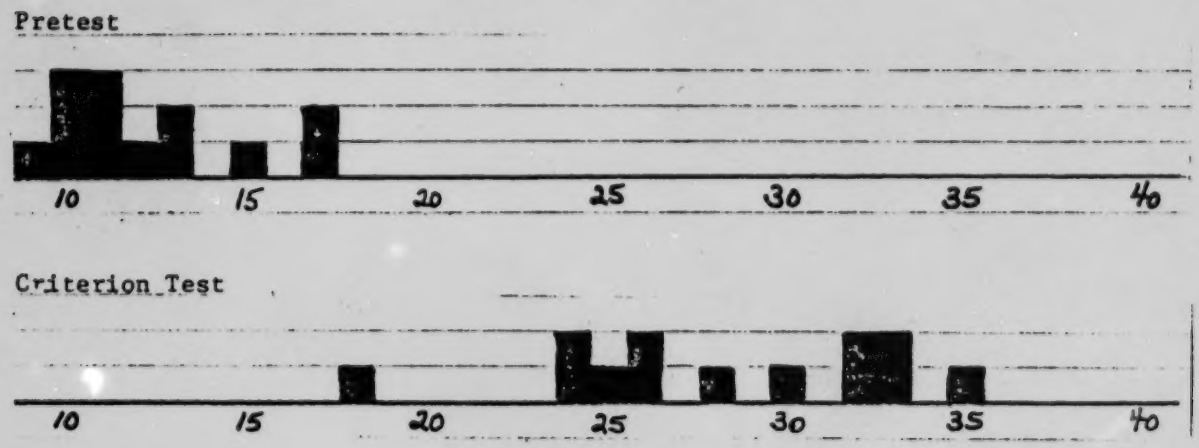


Figure 11

COOP-AG Test Results, MTYMPII-D2 Class

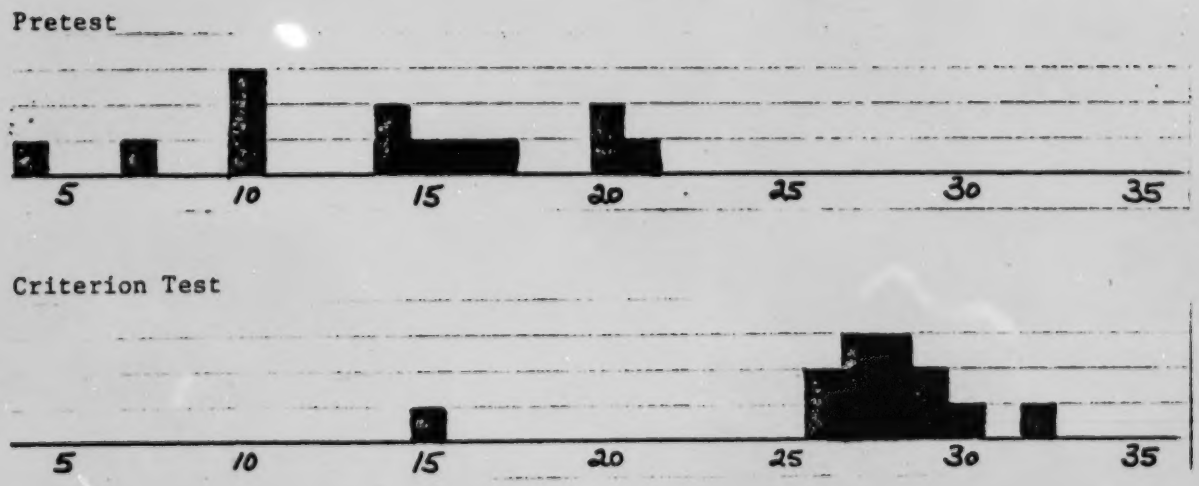


Table 18

Trigonometry and Analytic Geometry Achievement of MTYMPII-D2 Students

	Trigonometry	Analytic Geometry
Pretest Mean	145.8	143.3
Posttest Mean	168.8	169.3
Mean Gain	23.0	26.0
N	13	13
t	13.84	11.72
degrees of freedom	12	12
Significance (one tail test)	$p < .0005$	$p < .0005$

All scores are converted scores.

Table 19

Correlation Matrix For Test Scores
MTYMPII-TC2 Class

	SCAT-Q	SCAT-V	COOP-I	COOP-II	COOP-G	COOP-T
SCAT-Q	1.00					
SCAT-V	0.21	1.00				
COOP-I	0.49	0.21	1.00			
COOP-II	0.39	-0.04	0.36	1.00		
COOP-G	0.56*	-0.07	0.69***	0.69***	1.00	
COOP-T	0.62**	-0.11	0.66***	0.60**	0.77***	1.00

N = 15
* $p < .05$, two-tail test
** $p < .02$, two-tail test
*** $p < .01$, two-tail test

Table 20

Correlation Matrix For Test Scores
MTYMPII-D2 Class

	SCAT-Q	SCAT-V	COOP-I	COOP-II	COOP-G	COOP-T	COOP-AG
SCAT-Q	1.00						
SCAT-V	0.14	1.00					
COOP-I	0.69**	0.03	1.00				
COOP-II	0.63**	0.05	0.53	1.00			
COOP-G	0.56	0.51	0.51	0.79***	1.00		
COOP-T	0.35	0.48	0.44	0.76***	0.87***	1.00	
COOP-AG	0.20	0.36	0.45	0.31	0.46	0.30	1.00

N = 12
* $p < .05$, two-tail test
** $p < .02$, two-tail test
*** $p < .01$, two-tail test

Although the SCAT-Q score had been shown to be a significant predictor of achievement in the algebra course for both the 1976-77 and 1977-78 programs, that relationship was less apparent after the second year. As shown in Tables 19 and 20, significant correlations between SCAT-Q and achievement in geometry and trigonometry were observed in one class but not in the other. A stronger and more consistent correlation appears between the achievement results in algebra, geometry and trigonometry. This would appear to suggest that while SCAT-Q scores may be the best available criteria for initial selection, long-term success in the MTYMP is probably best predicted by prior achievement.

Attendance

Despite the fact that all three MTYMPII classes met after the regular school day, attendance remained high throughout the year. Attendance figures for the Duluth pupils were incomplete, but the data for the Twin Cities showed the following:

Number of Absences (30 weeks)	Number of Pupils MTYMPII-TC1	MTYMPII-TC2
0	13	10
1	6	3
2	4	1
3	1	0
4	1	1

Since pupils were responsible for their own transportation to and from the Hamline University campus, the above suggest a high degree of commitment by the participants and their parents.

Attitudes Toward Mathematics

Since the beginning of the MTYMP the Advisory Committee and teaching staff have stressed the importance of maintaining and enhancing positive attitudes toward mathematics. To monitor these traits in the pupils, participants have responded to the Mathematics Attitude Inventory (MAI) (Sandman, 1973). This instrument was administered at the time of the entry into the program and again in the spring of the first and second years.

The MAI contains statements with which the student expresses a degree of agreement or disagreement, and it yields scores on six dimensions of attitude:

Perception of the mathematics teacher: A measure of the students' view of the mathematics teacher with respect to a variety of personal characteristics.

Anxiety toward mathematics: A measure of the level of anxiety which the student feels in the presence of mathematics.

Value of mathematics in society: A measure of the student's view of the usefulness of mathematical knowledge.

Self-concept: Specifically, self-concept of ability in mathematics, a measure of the student's view of his or her own competence in the subject.

Enjoyment of mathematics: A measure of the pleasure the student derives from engaging in mathematical activity but not necessarily as compared to any other activity.

Motivation in mathematics: A measure of the student's desire to increase his or her mathematical knowledge--specifically, the desire to do work in mathematics beyond the regular class requirements.

Sandman (1973, p. 64) reported the results of a factor analysis of the items in the MAI. These results indicated that the six attitude scales appear to measure six empirically distinct constructs, and they gave evidence of the internal validity of the instrument. The reliabilities of the six scales using Cronbach's alpha coefficient were reported to be .83, .86, .77, .83, .85 and .76, respectively (Sandman, p. 54).

Each statement of the MAI calls for the student to strongly agree, agree, disagree, or strongly disagree. These responses are weighted from 1 to 4 in such a way that a positive attitude receives a 4. Scores on each of the six scales are the mean scores for the items in that scale. Hence, the range of possible scores is from 1 to 4 for each scale. A high score indicates a favorable or positive attitude on each scale except anxiety. For that scale, a high score suggests a high level of anxiety which is viewed as a negative or unfavorable characteristic.

Class means were calculated for each of the six scales on the fall and spring administrations of the MAI. These class means are shown in Table 21. Differences can be calculated as spring mean score minus fall mean score. Hence, a positive value of a difference would correspond to an increase on that dimension of attitude and would be seen as a desirable outcome in every case except anxiety. There a negative value for the difference would be representative of a decrease in anxiety, a favorable outcome. These class means can be viewed as descriptive characteristics of the classes as a whole. They suggest pupils with generally strong positive attitudes toward mathematics.

More information is gained by examining the changes in attitudes of various groups of pupils. It is also possible to test the significance of these changes using the t-test for related samples. Such comparisons are reported in Table 22. For these tests, only pupils who completed both pre and post assessments can be included in the analysis. This constraint forced the elimination of two pupils in each class.

For the first year pupils, the changes on all six scales were small and non-significant for the class as a whole. With one exception, the changes recorded for girls and boys in the class also were non-significant. But the direction of the changes were consistently opposite for girls and boys: girls showed slight increases in anxiety and decreases on the value, self-concept, enjoyment and motivation scales, while boys showed slight decreases in anxiety and slight increases on the other four dimensions. For the girls, the decrease in their perception of the value of mathematics was significant ($p < .05$). Two other changes, the decreases in enjoyment and motivation, approached but did not quite reach significance at the .05 level. (Both surpassed the $p < .10$ level).

A similar comparison was drawn between the attitude changes of thirteen pupils who intend to return for the 1978-79 program and ten who do not. Once again only one change reached significance (a decrease in motivation among non-returnees, $p < .05$), but the directions of the attitudinal changes recorded by the two groups were opposite on all but the perception of the teacher scale. These outcomes suggest that affective characteristics of the MTYMP pupils do influence their attitudes toward mathematics and their future involvement with the subject. They also indicate that additional investigations are necessary to identify effective means for enhancing the females' enjoyment, motivation and attitudes toward self

Table 21

Mathematics Attitude Inventory
Class Means

MAI Scales		MTYMP Classes		
		MTYMPII-TC1	MTYMPII-TC2	MTYMPII-D2
Perception of Math Teacher:	Fall Mean	3.32	3.14	NA
	Spring 1 Mean	3.44	3.40	3.24
	Spring 2 Mean		3.16	3.60
Anxiety toward Mathematics:	Fall Mean	1.45	1.44	NA
	Spring 1 Mean	1.46	1.45	1.48
	Spring 2 Mean		1.72	1.71
Value of Mathematics:	Fall Mean	3.57	3.48	NA
	Spring 1 Mean	3.52	3.72	3.59
	Spring 2 Mean		3.32	3.68
Self-Concept:	Fall Mean	3.32	3.42	NA
	Spring 1 Mean	3.30	3.46	3.21
	Spring 2 Mean		3.11	3.23
Enjoyment of Mathematics:	Fall Mean	3.30	3.51	NA
	Spring 1 Mean	3.21	3.52	3.33
	Spring 2 Mean		3.19	3.33
Motivation in Mathematics:	Fall Mean	2.72	2.88	NA
	Spring 1 Mean	2.65	2.84	2.94
	Spring 2 Mean		2.70	3.00

Table 22

Attitude Changes of MTYMP-TC Pupils

MAI Scale	MTYMPII-TC1 All S's N=23	Girls N=10	Boys N=13	Will Return N=13	Not Return N=10	MTYMPII-TC2 N=13 First Year Change	Second Year Change	Total Change	MTYMPII-D2 N=12 Second Year Change
Teacher									
Change	0.12	0.01	0.20	0.10	0.14	0.26	-0.24	0.02	0.36
t									
Significance	none	none	none	none	none	none	none	none	none
Anxiety									
Change	0.01	0.08	-0.12	-0.03	0.06	0.01	0.27	0.28	0.23
t							3.26	2.59	
Significance	none	none	none	none	none	none	$p < .01$	$p < .05$	none
Value									
Change	-0.05	-0.14	0.02	-0.01	-0.10	0.24	-0.40	-0.16	0.09
t		-2.33				2.33	-7.21		
Significance	none	$p < .05$	none	none	none	$p < .05$	$p < .001$	none	none
Self-Concept									
Change	-0.02	-0.19	0.11	0.04	-0.10	0.04	-0.35	-0.31	0.02
t							-3.54	-5.18	
Significance	none	none	none	none	none	none	$p < .01$	$p < .001$	none
Enjoyment									
Change	-0.09	-0.40	0.14	0.07	-0.31	0.01	-0.33	-0.32	0
t							-5.12	-4.09	
Significance	none	none	none	none	none	none	$p < .001$	$p < .01$	none
Motivation									
Change	-0.07	-0.32	0.14	0.16	-0.35	-0.04	-0.14	-0.18	0.06
t					-2.69				
Significance	none	none	none	none	$p < .05$	none	none	none	none

All tests of significance are two-tailed tests. Only significant t-values are recorded.
Changes are determined as spring mean minus fall mean (or Spring 2 minus Spring 1).

and toward mathematics. Such action is important to help assure that talented girls do not elect to discontinue the study of mathematics at this critical junior high school period.

The attitude changes for the second year classes were more diverse and therefore more puzzling. For the Duluth pupils no data were available from the time they entered the program, but scores on the MAI administered at the end of each year showed no significant changes over the second year. Among MTYMPII-TC2 pupils this was not the case. They displayed significant increases in anxiety and significant decreases on the value, self-concept and enjoyment scales during this second year. By contrast, over the fist year the attitudes of these pupils did not change significantly on five of the six scales. The one change which was significant was an increase in their perception of the value of mathematics. However, the decrease on this same scale over the second year yielded a new non-significant change for the two year period. The increase in anxiety and decreases in self-concept and enjoyment were significant over two years.

No conclusions can be drawn from the above since the patterns of attitude changes differed for the two geometry-trigonometry classes. Further, it should be noted that even where changes did occur, the mean scores themselves were high and did not differ greatly among the three classes. Continued monitoring of attitude patterns of the MTYMP pupils should be encouraged, and further study of these characteristics may yield more definitive information on the relationships of these traits to pupils' success and continued study of mathematics.

Learning Environment in MTYMPII

In a continued effort to learn how MTYMP pupils view their accelerated classes, the evaluation program also included pupil assessment of the learning environment in the three MTYMPII classes.

Students in the three classes responded at the end of the course to the Learning Environment Inventory (LEI) (Anderson, 1971). The LEI consists of 105 statements about the classroom climate with which the pupil strongly agrees, agrees, disagrees, or strongly disagrees. It is scored in a manner similar to the scoring of the MAI described earlier. The LEI yields scores on 15 dimensions of the classroom environment, and class means on these 15 scales can be viewed as an estimate of classroom climate. Three of the scales, cohesiveness, friction and competitiveness, measure interpersonal relationships between pupils. Pupil-teacher relationships are assessed in four scales: formality, democracy, disorganization and favoritism. The speed, difficulty, diversity and satisfaction measures refer to relationships between the pupils and both the subject studied and the method of learning. Finally, the pupils' perception of the structural characteristics of the class are assessed in the goal direction, environment, cliqueness and apathy scales. Each of these scales is described briefly below:

Cohesiveness: a feeling of intimacy which may develop when individuals interact for a period of time and which serves to separate group members from nonmembers.

Friction: the degree of disagreement, tension, and antagonism in the class.

Competitiveness: the extent to which class members vie with each other.

Formality: the degree to which the behavior of class members is governed by formal rules.

Democracy: the degree of student participation in class decision making.

Disorganization: the extent to which the class is lacking in organization.

Favoritism: the extent, to which certain students enjoy more privileges than others.

Speed: the rate of progress of the class.

Difficulty: the extent to which the pupils are challenged by the subject matter.

Diversity: the extent to which the class provides for a variety of pupil interests and activities.

Satisfaction: the degree of pupil liking for the class.

Goal direction: the degree of group recognition and subsequent acceptance of goals.

Environment: an assessment of the physical environment, including space and available facilities.

Cliqueness: the existence of subgroups within a class.

Apathy: the extent to which class members feel no affinity with class activities.

Anderson presented an extensive discussion of the validity of the LEI scales which will not be repeated here. He also reported alpha coefficients of internal consistency ranging from .54 to .86 for the 15 scales with most of these values lying between .65 and .86. Complete reliability and validity data are available in Anderson (1971).

Shown in Table 23 are the class means on the LEI for the three MTYMPII classes. As with the MAI, the class means are descriptive only and no attempt should be made to draw statistical comparisons.

Scores on the LEI range from 1 to 4 with 4 indicating a high degree of the variable in question. As an approximation of classroom climate, scores of 2.9 and above were taken to indicate a high degree of agreement that the given characteristic describes the class; a score of 2.1 or below indicated disagreement with the given characteristic as descriptive of the class. These are indicated as plus (agreement) and minus (disagreement) in Table 23.

In general, pupils in all three MTYMPII groups viewed their classes as difficult, goal directed and organized. Their disagreement with the apathy scale indicated that pupils did feel an affinity or identity with the class activities. They did not feel the teachers communicated favoritism toward individual class members. Members of the three groups also reported generally high levels of satisfaction with the class. In addition, pupils in the two Twin Cities classes rated their programs as fast paced (i.e., high on the speed scale) and low on the friction scale, while Duluth pupils felt they participated in class decision

Table 23
Learning Environment Characteristics
Class Means

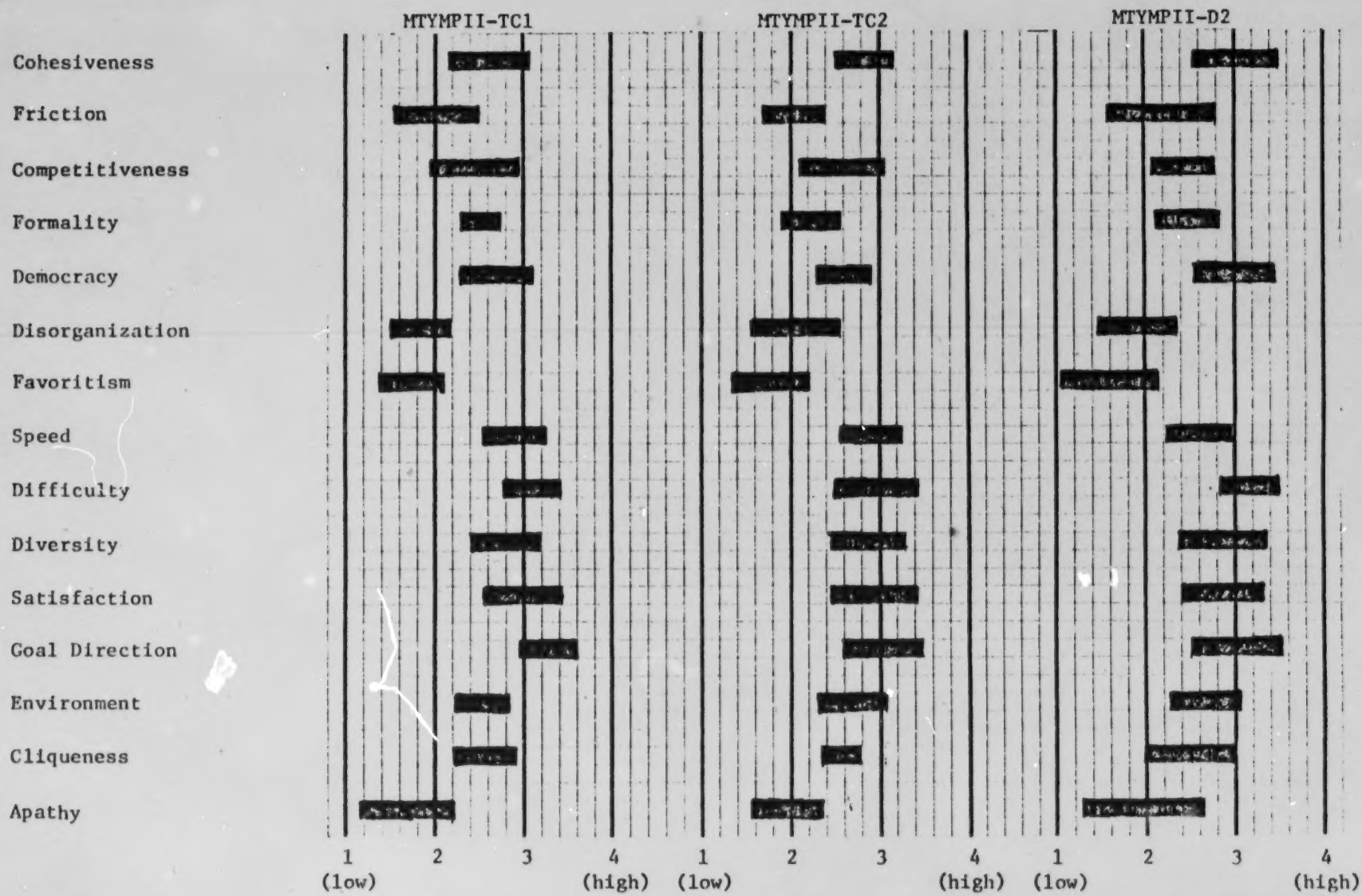
Environment Scale (LEI)	MTYMPII-TC1	MTYMPII-TC2	MTYMPII-D2
Cohesiveness	2.61	2.83	3.02+
Friction	2.01-	2.05-	2.19
Competitiveness	2.45	2.57	2.43
Formality	2.51	2.23	2.48
Democracy	2.70	2.60	2.99+
Disorganization	1.84-	2.05-	1.91-
Favoritism	1.73-	1.78-	1.62-
Speed	2.90+	2.90+	2.60
Difficulty	3.10+	2.97+	3.17+
Diversity	2.80	2.88	2.86
Satisfaction	2.98+	2.95+	2.87
Goal direction	3.27+	3.04+	[illegible]+
Environment	2.55	2.70	2.66
Cliqueness	2.57	2.56	2.49
Apathy	1.69-	1.97-	1.96-

+indicates a high level of agreement with the characteristic (mean of 2.9 or above).

-indicates a high level of disagreement (mean of 2.1 or below).

Figure 12

Student Perceptions of the Learning Environment
in MTYMPII Classes



Bands represent class mean plus and minus one standard deviation.

making as reflected in the high democracy rating. Figure 12 further describes the perceptions which the MTYMPII pupils had of their classes.

Future Plans of MTYMPII Pupils

In the Spring of 1978 funding was awarded for a third year of the MTYMP. Once again, three classes will be offered: two in the Twin Cities and one in Duluth. Based on the interest of present MTYMPII-TC1 pupils, the Advisory Committee chose to offer one section of geometry - trigonometry for pupils in the Twin Cities. Two new classes will be formed, one in Duluth and one in the Twin Cities, and pupils will be chosen by means of a Third Annual Minnesota Mathematics Talent Search in September 1978.

Of the twenty-five pupils who completed the Algebra program in 1977-78, fifteen have indicated their intent to enroll in the second year course: thirteen of the fifteen boys and two of the ten girls. (One of the two non-returning boys indicated that he would return if possible but that the family was planning to move from Minnesota.) The high retention of boys in the second algebra class is encouraging and greatly increased over the 1976-77 class. However, the high attrition of girls from the program must be viewed with concern. While the phenomenon of girls dropping out of mathematics is widely recognized as a common problem beginning at the end of the junior high school years, it has been a hope of MTYMP personnel that particiaption in the program would enhance the girls' interest in and desire to study mathematics. It is too soon to assess whether these girls will elect mathematics in their home schools in future years, but their present plans do not include MTYMP classes.

The girls' choices not to continue in the MTYMP tend to confirm the patterns of attitude change reported earlier, and they reinforce the need to identify effective means of relating the mathematics learning experience to the interests and aspirations of female pupils.

Follow-up on Past Pupils

As reported earlier, 48 pupils entered the first MTYMP-TC classes. Fifteen of these re-enrolled for MTYMPII. In an effort to follow-up on the 33 who did not return, questionnaires were sent to the parents of these pupils in June, 1978. (See Appendix C.) Twenty-one of the 33 (64 percent) responded. The following information was gathered from those responses, which were prepared jointly by parents and pupils.

All 21 pupils took mathematics in their home schools during 1977-78, and three of the 21 reported taking two mathematics courses. Twenty of the pupils were in a geometry course, and nine of these described their course as "honors geometry," "accelerated geometry," or the equivalent. One pupil took analysis, two took geometry and analysis, and one took geometry and computer math. Eighteen of the 21 reported plans to take mathematics in 1978-79: three will take Algebra II, four will take trigonometry (including two whose course was reported as Algebra II and trigonometry), five will take analysis, three will take calculus, and four will take various other senior mathematics courses. One former pupils asked to return to the MTYMP geometry-trigonometry course, and a second expressed a strong interest in the trigonometry portion of the MTYMP course. One of the three who planned no mathematics in 1978-79, one did report the intention to enroll in senior mathematics the following year.

In rating their mathematics classes in their home schools, four pupils found them to be difficult, six described them as moderately difficult or difficult at

times, and nine reported them to be not difficult. In terms of their interest in the class, nine pupils found their courses interesting, seven reported moderate interest or interest some of the time, and six rated their interest as low. Two frequently used phrases on the responses were "boring" and "too easy," and most replys indicating partial or low interest were qualified by one or both of these descriptors.

The most frequently cited benefit from their participation in the MTYMP was the fact that students were one to two years ahead in mathematics. Next highest in value to them was their experience of challenge. Several also specified that this challenge come both from the pace of the course and from the competition from other talented students. Other benefits reported by the former pupils included good preparation for their current mathematics course, heightened interest in mathematics and improved study habits. Only one pupil responded that he experienced no particular value from his participation in the program.

The former pupils also offered several recommendations to the program personnel. Chief among these was a request for continued communication especially in the form of guidance on future mathematics courses they should take, good college mathematics programs, available scholarships, etc. Better communications with home school teachers, counselors and administrators also was recommended, and several expressed a desire for the MTYMP to offer other advanced courses including calculus.

Summary and Reommendations

Fifty-seven outstanding mathematics students entered the MTYMPII program in the fall of 1977. Twenty-eight of these were new pupils selected through the Second Annual Minnesota Mathematics Talent Search; 25 of the 28 completed the first year curriculum and earned credit in Algebra I and Algebra II. Twenty-nine other pupils enrolled in one of two second year courses to study geometry and trigonometry. Of these, 28 had been participants in the first MTYMP program. All 29 pupils earned high school credit for geometry and 28 earned credit in trigonometry.

All of the MTYMPII classes met weekly for a two hour class for 30 weeks. All classes were held after the regular school day at sites central to the Twin Cities and Duluth areas.

The 1977 talent search again met with mixed success. Those schools which entered pupils in the talent search sent from one to 46 participants each, but fewer than one-third of the schools in the Twin Cities area were represented. It appears that publicity for the talent search remains a problem. Project directors might seek other means of disseminating information in addition to the letters to principals, counselors and department heads. It also will be useful for future program evaluation to maintain complete records of the qualifying test scores of all talent search participants.

The selection criteria based on SCAT-Q score with a minimum SCAT-V continue to appear to be sound and appropriate. Both should be retained.

The effort to include girls in the project was successful in terms of selection, but the high attrition of girls during and after the first year is a serious concern. The Advisory Committee and project staff should investigate alternatives for monitoring progress by the girls during 1978-79 and for finding effective means of maintaining and enhancing their attitudes and successful experiences. Since no sex differences in achievement were noted, the difficulties which girls experienced

in the program appear to be related to affective qualities rather than to any differences in ability or achievement.

All of the MTYMPII pupils demonstrated significant achievement in mathematics as measured by their performance on the standardized COOP tests. The significance of the achievement gains in algebra, geometry and trigonometry have been adequately demonstrated during the two years of the MTYMP, and there appears to be little need for the COOP pretests in the future. MTYMP teachers and pupils can benefit more from the class time gained by eliminating those preassessments. The use of diagnostic pretests, however, should be retained as a guide to instructional planning. The COOP criterion tests also should be retained as these are accepted by home schools as indicators of mastery and credit earned.

Continued interest in the attitudenal characteristics of MTYMP pupils should be supported and encouraged particularily because of the preliminary indication that these are related to a pupil's future mathematical goals. Contact also should be maintained with pupils after they leave the MTYMP both to provide guidance and encouragement to MTYMP alumni and to monitor their progress throughout high school and beyond.

Efforts to communicate with the parents and home schools of the pupils have been generally good, and these remain always a high priority. Such communications also may help to attract future pupils to the talent search. The project directors also might consider adding one or more parents and representatives from the home schools to the Advisory Committee.

One specific aspect of arrangements with the home schools will be the need to assist schools in making provision for MTYMP alumni after the program. A few former pupils reported plans to study calculus in a local community college while still in high school. Arrangements of this type will probably be needed even more in the future.

Once again the large number of talent search pupils from a single school underscores the need for local districts to increase the options available to gifted pupils. Any assistance which the State Department of Education can provide in this regard should be encouraged.

Finally, the success of the MTYMP during both years of its existence justifies continued efforts to maintain and expand support for the program. It is recommended that in the future similar classes can be offered at other sites throughout Minnesota.

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Appendix A
MTYPM Advisory Committee

Twin Cities Advisory Committee

Louis Cohen, Mathematics Teacher, Bloomington Public Schools.

David Dye, Coordinator of Mathematics Education, Minnesota State Department of Education.

Themeo Ellis, Principal, Carl Sandburg Junior High School, Robbinsdale.

William George, Associate Director, SMPY, Johns Hopkins University, Baltimore, MD.

Lorraine Hertz, Gifted Education Coordinator, Minnesota State Department of Education.

Peggy House, Associate Professor, Mathematics Education, University of Minnesota.

Daniel Keating, Associate Professor, Institute of Child Development, University of Minnesota.

Harvey Keynes, Associate Professor, Mathematics, University of Minnesota.

Elmer Koch, Minnepolis Public Schools.

Charles Lund, Mathematics Supervisor, St. Paul Public Schools.

Sally Sloan, Computer Resource Teacher, Minneapolis Public Schools.

Lonnie Tuttle, Office of Admissions, Hamline University, St. Paul.

Jan Wahl, Mathematics Curriculum Committee, Archdiocese of St. Paul-Minneapolis.

Steven Watson, Quest Program Director, St. Paul Public Schools; MTYMP Program Director.

Duluth Advisory Committee

Larry Annett, Curriculum Director, Duluth Public Schools.

David Dye, Coordinator of Mathematics Education, Minnesota State Department of Education.

John Hanson, Superintendent of Schools, Esko, Minnesota.

Lorraine Hertz, Gifted Education Coordinator, Minnesota State Department of Education.

Steven Watson, MTYMP Program Director.

James Zak, Mathematics Teacher, Cloquet Junior High School.

MTYMP Teachers

Lynn Durward, Duluth Public Schools

Eunice Kanning, Minneapolis Public Schools

Larry Luck, Minneapolis Public Schools

MTYMP Teaching Assistants

Cathy Knapper, Minneapolis

Barbara Ann Makitalo, Duluth

Steve Rosenberg, Minneapolis

Appendix B
MTYMP Guidelines

B-1: Policy Guidelines for Teachers of Fast-Paced Classes

B-2: Policy Guidelines for Suggested Testing Procedures

B-3: Policy Guidelines for the Home Schools of the Students

B-4: State Department of Education Special Requirements for Secondary Schools

B-5: Policy Guidelines for Parents and Students

MINNESOTA TALENTED YOUTH MATH PROJECT

POLICY GUIDELINES FOR TEACHERS OF FAST-PACED CLASSES

1. Teacher is responsible for:

   a. Teaching 30 two-hour class sessions.

      1) These class sessions should concentrate upon the instruction of the mathematics course material usually included in Algebra I and Algebra II. Guest speakers, tutorial work, take-home tests, and correcting of homework should be done outside of the regular class time.

2. Teacher is expected to teach to completion Algebra I and Algebra II. Trigonometry should be included if time permits.

3. Homework should be given, corrected, and returned regularly to properly monitor student achievement.

4. Guest speakers who might make presentations on the application of mathematics can be arranged to meet with the class before or after the class period or on some other day. This type of broadening experience is recommended.

5. The project will attempt to obtain qualified teaching assistants for those MTYMP teachers who request them. A small budget is provided for this purpose.

6. Teacher and students may design their own meeting schedule only if all students agree. They will have enough flexibility so that classes could be lengthened, doubled up, etc., in order to serve the needs of both students and teachers; for example, two three-hour classes instead of three two-hour classes for the occasional special situation.

7. The specific math curriculum (textbooks, etc.) should be determined cooperatively by the teachers and the advisory committee.

8. Teacher is expected to do all of the above and spend whatever time is necessary to complete the program at the stated salary of $50.00 per two-hour class session. The out-of-class time spent on planning, curriculum development, preparation, and student monitoring is expected to be performed without additional pay. A teaching assistant can be requested and the MTYMP has a small budget to cover the salary for such.

9. Teacher and the MTYMP will enter into a contractual agreement. If any of the above is not complied with, the teacher may be withdrawn from the program prior to completion.

MINNESOTA TALENTED YOUTH MATH PROJECT

POLICY GUIDELINES SUGGESTED TESTING PROCEDURES

1. Give standardized pre- and post-tests such as the Cooperative Mathematics Series to determine what to teach and whether or not to grant credit for completion of the course. The use of the diagnostic test is highly recommended because these students are far advanced over the students normally taught in standard Algebra I and Algebra II courses.

2. Set percentage minimums for successful performance in the courses. These should be in order for the school to grant credit.

3. Teacher-made tests should be given often to cover material taught in the class.

4. Take-home teacher-made tests are recommended to be used in conjunction with the ongoing, in-class tests.

5. Testing has to be done in order to identify student performance and achievement levels. Because of the extraordinarily high ability of the students, it is difficult for the teacher to know exactly what needs to be taught. TIES or MECC Comprehensive Achievement Monitoring (C.A.M.) tests may be used for prognosis and diagnosis of students' knowledge of subject matter to be taught. Frequent tests should eliminate the probability of a student participating all year and then not being able to achieve at the required achievement level for credit.

6. As much as possible, testing should occur outside the two hour class period.

MINNESOTA TALENTED YOUTH MATH PROJECT

POLICY GUIDELINES FOR THE HOME SCHOOLS OF THE STUDENT

1. School will accept the achievement of 88% on nationally standardized Algebra I and Algebra II tests such as Cooperative Mathematics Series and give students credit for each course he/she satisfactorily completes. Credit granted should be in mathematics.

2. Schools will provide one or more of the following options for the students in lieu of their regular math class: an opportunity to take a computer course; a study period when he/she can complete homework given in fast-paced class; time to work on independent study projects related to math, etc. A dinner meeting will be provided by the MTYMP for representatives (e.g., counselor or math teacher) from each student's junior high school wherein appropriate plans for each student will be made.

3. Schools must not require student who has satisfactorily completed Algebra I and II to take seventh grade mathematics, eighth grade mathematics, Algebra I, Algebra II, or other math classes which he/she has already shown is not appropriate for him/her.

4. Schools should have one or more of the following options available to students who satisfactorily complete the fast-paced mathematics sequence:

   a. Plane geometry in own or nearby junior or senior high school.
   b. Analysis/trigonometry in high school.

5. Junior and senior high schools should work together to give student's schedule flexibility in order for the student to take advanced math classes. It might be desirable to plan for possible taking of college math classes while student is in high school.

6. If no other way of continuous math classes can be found, it might be desirable to investigate independent study in math under the guidance of a senior high math teacher.

7. Fast-paced math classes implemented by the MTYMP have been approved by Edmund Lee, Director of Secondary Education; Dave Dye, Coordinator of Mathematics Education; and Lorraine Hertz, Gifted Education Coordinator; all of the Minnesota State Department of Education. They have also been approved by the Office of Gifted Education of the Federal Department of Health, Education, and Welfare which has provided the financial grant for the project.

MINNESOTA TALENTED YOUTH MATH PROJECT

CHAPTER THREE: EDU 40-59 CLASSIFICATION FOR STATE AIDS, SPECIAL REQUIREMENTS FOR SECONDARY SCHOOLS

(aa) Junior secondary period. Minimum clock hours for Mathematics is 360.

The MTYMP will meet this requirement in the following manner:

1. Seventh graders who take the fast-paced math class will have 60 hours of this class in 1976-1977 in addition to 120 hours of guided independent study in math or computer courses or other specially designed math class during the 1976-1977 school year.

   During 1977-78 students will take advanced math class for 145 hours per year.

   Most of these MTYMP students could be expected to take a full year of advanced mathematics during the 1978-1979 school year.

TOTAL 470 hours

2. Eighth graders who take the MTYMP fast-paced class will have completed 145 hours in 1975-1976 in the seventh grade and will have 60 hours of the fast-paced class in 1976-1977 plus 120 hours of guided independent study in math or computer courses, etc., during 1976-1977. In addition, these students will be expected to take an advanced class during their 9th grade.

TOTAL 465 hours

3. Ninth graders who take the MTYMP fast-paced class will have completed 290 hours of math before taking the fast-paced and independent study classes during 1976-1977.

TOTAL 470 hours

Please note: Typical class offering in Minnesota schools is 145 hours (based on 175 fifty-minute periods.)

MINNESOTA TALENTED YOUTH MATH PROJECT

POLICY GUIDELINES FOR PARENTS AND STUDENTS

1. Classes are available to the fifty highest scoring students in the Metropolitan area who participate in the Minnesota Math Talent Search. Fifty alternates will be selected for the project on the basis of their test scores in the Search.

2. The two fast-paced classes in the Metropolitan area will meet two hours per week for thirty weeks through June 4, 1977, with a two-week break during December 18 and January 3, 1977. A one-week break will be during the spring between April 2 and April 11.

3. Classes are not for enrichment but are designed for credit. Students are expected to attend all of the class sessions and complete all assignments in order to successfully complete the planned math sequence for credit.

4. Participation in the program is voluntary.

5. Students' home schools will provide time or class for homework completion, additional math work in independent study or other related mathematics materials, etc., during the regular school day in lieu of his/her regular math class.

6. Program is for one year from October, 1976, to June, 1977.

7. Students can only qualify for program by taking the SCAT verbal and nonverbal tests, Series 2, Level 2 which will be given on October 2 in the Metropolitan area and on October 16 in the Duluth area. Eligibility for taking this SCAT test is earning a score of 97%ile or above in any in-grade, in-school standardized mathematics test, i.e., IOWA, SRA, etc. Students do not need to have a composite math score of 97%ile to qualify - a 97%ile in any one math test is sufficient.

8. Not only will schools provide alternative math opportunities during the school year for students in the MTYMP, but schools will also provide alternative mathematics programming for these students next year and the years after that. These arrangements will be made jointly by the school and the MTYM Project.

9. The students who are eligible for the program are those public and private youngsters in grades 7, 8, and 9 if they have not completed Algebra I.

10. Fast-paced math classes conducted by the Minnesota Talented Youth Math Project are approved and sanctioned by Edmund Lee, Director of Secondary Education; David Dye, Coordinator of Math Education; and Lorraine Hertz, Gifted Education Coordinator; all of the Minnesota State Department of Education. The MTYMP has been approved and has been funded by the Office of Gifted Education of the Department of Health, Education and Welfare in Washington, D.C.

Appendix C

Communications

C-1: Call for Talent Search Participants

C-2: Parent Consent Forms

C-3: Course Description and Rationale

C-4: 1977-78 Schedule

C-5: Questionnaires to Former Pupils

State of Minnesota

Department of Education
Capitol Square, 550 Cedar Street
St. Paul, Minnesota 55101

IMPORTANT NOTICE TO JUNIOR HIGH SCHOOL PRINCIPALS
SECOND ANNUAL MINNESOTA MATH TALENT SEARCH

TESTING WILL BE HELD DURING FOUR 1½ HOUR SESSIONS ON SATURDAY, SEPT. 10 (9:00, 10:30, 1:00) AND THURSDAY, SEPT. 15 (3:30 p.m.). PROSPECTIVE ENROLLEES MUST ATTEND ONE OF THESE SESSIONS.

LOCATIONS FOR THE MATH TALENT SEARCH TESTS:

Saturday, Sept. 10 - Hamline University. Second floor of Old Main Building which is ½ block east of Snelling on Hewitt Avenue, St. Paul.

Thursday, Sept. 15 - St. Paul Central High School. School cafeteria in basement of school. Central is on Marshall Avenue at Lexington Ave. in St. Paul.

Please urge all of the students you know who have percentile scores of 97 or higher in any recent standarized math achievement test and who have not completed Algebra 1 to enter the Minnesota Math Talent Search. They will be given quantitative and verbal tests in order to determine the twenty-five most outstanding math students in grades seven and eight in the Twin Cities metropolitan area.

In addition to recognition for their achievement, the Minnesota Math Talent Search winners will be invited to participate in a special fast-paced mathematics program which will be held at Hamline University on Thursday afternoons during the 1977-1978 school year. Arrangements have been made so that successful completion of this program will be substituted for regular junior high math classes. This will enable highly talented math students to move at the pace and depth which is appropriate for their extraordinary ability and master Algebra 1 and 2 in 60 hours.

It is important that only those students who have math achievement scores of 97% or above enter the talent search because the test is extremely difficult.

APPLICATION FORM FOR MINNESOTA MATH TALENT SEARCH
(for multiple entries, please duplicate this form)

Return to Steve Watson, Project Director, Central High School, 275 N. Lexington Parkway, St. Paul, 55104 BEFORE September 10, 1977.

Student's Name_____ Address_____

Phone_____ School_____ Grade_____

Math Teacher_____

Name of Math Achievement Test_____

Score (in percentiles)_____ Date Taken_____

School Counselor_____ School Telephone_____

Which session will the student attend? (Check one) Please arrive at designated time. This is your only notice.

Sat. 9:00 a.m. ____ Or Sat. 10:30 a.m. ____ or Sat. 1:00 p.m. ____ or Thurs., 3:30 p.m. ____

There is no charge for the Minnesota Math Talent Search or for the course. If you have any questions, please call Lorraine Hertz, 296-4072, Gifted Education Coordinato

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State of Minnesota

Department of Education
Capitol Square, 550 Cedar Street
St. Paul, Minnesota 55101

IMPORTANT NOTICE TO JUNIOR HIGH SCHOOL COUNSELORS
SECOND ANNUAL MINNESOTA MATH TALENT SEARCH

TESTING WILL BE HELD DURING FOUR 1½ HOUR SESSIONS ON SATURDAY, SEPT. 10 (9:00, 10:30, 1:00) AND THURSDAY, SEPT. 15 (3:30 p.m.). PROSPECTIVE ENROLLEES MUST ATTEND ONE OF THESE SESSIONS.

LOCATIONS FOR THE MATH TALENT SEARCH TESTS:

Saturday, Sept. 10 - Hamline University. Second floor of Old Main Building which is ¼ block east of Snelling on Hewitt Avenue, St. Paul.

Thursday, Sept. 15 - St. Paul Central High School. School cafeteria in basement of school. Central is on Marshall Avenue at Lexington Ave. in St. Paul.

Please urge all of the students you know who have percentile scores of 97 or higher in any recent standarized math achievement test and who have not completed Algebra 1 to enter the Minnesota Math Talent Search. They will be given quantitative and verbal tests in order to determine the twenty-five most outstanding math students in grades seven and eight in the Twin Cities metropolitan area.

In addition to recognition for their achievement, the Minnesota Math Talent Search winners will be invited to participate in a special fast-paced mathematics program which will be held at Hamline University on Thursday afternoons during the 1977-1978 school year. Arrangements have been made so that successful completion of this program will be substituted for regular junior high math classes. This will enable highly talented math students to move at the pace and depth which is appropriate for their extraordinary ability and master Algebra 1 and 2 in 60 hours.

It is important that only those students who have math achievement scores of 97% or above enter the talent search because the test is extremely difficult.

APPLICATION FORM FOR MINNESOTA MATH TALENT SEARCH
(for multiple entries, please duplicate this form)

Return to Steve Watson, Project Director, Central High School, 275 N. Lexington Parkway, St. Paul, 55104 BEFORE September 10, 1977.

Student's Name_____ Address_____

Phone_____ School_____ Grade_____

Math Teacher_____

Name of Math Achievement Test_____

Score (in percentiles)_____ Date Taken_____

School Counselor_____ School Telephone_____

Which session will the student attend? (Check one) Please arrive at designated time. This is your only notice.

Sat. 9:00 a.m. _____ or Sat. 10:30 a.m. _____ or Sat. 1:00 p.m. _____ or Thurs., 3:30 p.m. _____

There is no charge for the Minnesota Math Talent Search or for the course. If you have any questions, please call Lorraine Hertz, 296-4072, Gifted Education Coordinator.

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State of Minnesota

Department of Education
Capitol Square, 550 Cedar Street
St. Paul, Minnesota 55101

IMPORTANT NOTICE TO JUNIOR HIGH SCHOOL MATH DEPARTMENT CHAIRMAN
SECOND ANNUAL MINNESOTA MATH TALENT SEARCH

TESTING WILL BE HELD DURING FOUR 1½ HOUR SESSIONS ON SATURDAY, SEPT. 10 (9:00, 10:30, 1:00) AND THURSDAY, SEPT. 15 (3:30 p.m.). PROSPECTIVE ENROLLEES MUST ATTEND ONE OF THESE SESSIONS.

LOCATIONS FOR THE MATH TALENT SEARCH TESTS:

Saturday, Sept. 10 - Hamline University. Second floor of Old Main Building which is ¼ block east of Snelling on Hewitt Avenue, St. Paul.

Thursday, Sept. 15 - St. Paul Central High School. School cafeteria in basement of school. Central is on Marshall Avenue at Lexington Ave. in St. Paul.

Please urge all of the students you know who have percentile scores of 97 or higher in any recent standarized math achievement test and who have not completed Algebra 1 to enter the Minnesota Math Talent Search. They will be given quantitative and verbal tests in order to determine the twenty-five most outstanding math students in grades seven and eight in the Twin Cities metropolitan area.

In addition to recognition for their achievement, the Minnesota Math Talent Search winners will be invited to participate in a special fast-paced mathematics program which will be held at Hamline University on Thursday afternoons during the 1977-1978 school year. Arrangements have been made so that successful completion of this program will be substituted for regular junior high math classes. This will enable highly talented math students to move at the pace and depth which is appropriate for their extraordinary ability and master Algebra 1 and 2 in 60 hours.

It is important that only those students who have math achievement scores of 97% or above enter the talent search because the test is extremely difficult.

APPLICATION FORM FOR MINNESOTA MATH TALENT SEARCH
(for multiple entries, please duplicate this form)

Return to Steve Watson, Project Director, Central High School, 275 N. Lexington Parkway, St. Paul, 55104 BEFORE September 10, 1977.

Student's Name_____ Address_____

Phone_____ School_____ Grade_____

Math Teacher_____

Name of Math Achievement Test_____

Score (in percentiles)_____ Date Taken_____

School Counselor_____ School Telephone_____

Which session will the student attend? (Check one) Please arrive at designated time. This is your only notice.

Sat. 9:00 a.m. ____ or Sat. 10:30 a.m. ____ or Sat. 1:00 p.m. ____ or Thurs., 3:30 p.m. ____

There is no charge for the Minnesota Math Talent Search or for the course. If you have any questions, please call Lorraine Hertz, 296-4072, Gifted Education Coordinator.

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INFORMATION NOTICE

Minnesota Math Talent Search
Minnesota Talented Youth Mathematics Project (MTYMP)

Monday,
August 29, 1977

Enclosed is a copy of the second annual Minnesota Math Talent Search application form. This year's Search will be held on Saturday, September 10, 1977, at Hamline University, in St. Paul, and Thursday, September 15, 1977, at St. Paul Central High School (see directions).

Space is limited on these testing dates. On Saturday, September 10, there is space for testing for 150 students at 9:00 a.m., space for another 150 students at 10:30 a.m., and space for 300 students at 1:00 p.m. On Thursday, September 15, there is space at Central for another 300 students.

The Search tests are to determine the top seventh and eighth grade mathematics students in the Twin City metropolitan area. These top students will be invited to participate in the second Minnesota Talented Youth Mathematics Project (MTYMP), which will be offered on Thursday afternoons, from 4:00 to 6:00 p.m., at Hamline University, beginning the third week of September. This class, like last year's, will cover Algebra I and Algebra II in a 30 week fast-paced course.

Last year more than 500 students participated in the first Minnesota Math Talent Search. Ironically, seven out of the 103 public and 114 parochial junior high schools sent more than 36% of the five hundred participants. Many school districts and schools did not take part in the Search at all. This year, due to earlier notification of the testing times and dates, and more information about the MTYMP, greater participation is anticipated.

The 48 students who participated in last year's MTYMP came from the following eighteen metropolitan school districts: North St. Paul; St. Paul Park; Osseo; West St. Paul; Eden Prairie; New Brighton; Roseville; Columbia Heights; Richfield; St. Paul; Bloomington; Lakeville; Coon Rapids; Fridley; the Minneapolis-St. Paul Archdiocese; White Bear Lake; Anoka, and Blaine.

In order to be eligible to participate in the Math Talent Search test, a student has to have scored at the 97% percentile level or above on a standardized mathematics achievement test, be in the seventh or eighth grade, and not have completed Algebra I.

Please complete the application, indicating which time and date for testing that you want, and return the form to:

Mrs. Lorraine Hertz
Gifted Education Coordinator
641 Capitol Square Building
St. Paul, MN. 55101
296-4072

OR

Steven R. Watson - Director MTYMP
275 North Lexington Parkway
St. Paul, MN. 55104
645-9217, ext. 9

Due to the space limitations at the testing sites, it will be necessary for the school's representative to confirm the requested testing date and time. All applications are to be returned by Wednesday, September 8, 1977, for Saturday's test, or by Tuesday, September 13, 1977, for Thursday's test.

Thank you for your assistance in implementing this Math Talent Search.

Respectfully,

Steven R. Watson

Minnesota State Department of Education
Capitol Square ☐ 550 Cedar Street ☐ St. Paul, Minnesota 55101

MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT (MTYMP)

May 30, 1978

Dear Principal,

The second year of the Minnesota Talented Youth Mathematics Project (MTYMP) was completed on Thursday, May 25, 1978. All of this year's forty (40) students successfully completed the course work. I want to thank you for your support of the MTYMP and your willingness to assist these students in achieving a most worthwhile goal.

The highly successful MTYMP has been refunded by HEW (Public Law 93:380) for a third year, 1978-79. The outstanding accomplishment of the MTYMP was an important factor in the decision to continue the program for a third year.

The refunding means that the program will again offer three accelerated mathematics classes in Minnesota. In order to do this, the third Minnesota Math Talent Search will be held on the following dates:

A. Saturday, September 9, 1978 - Hamline University (Twin City area)

B. Tuesday, September 12, 1978 - Hamline University (Twin City area)

C. Saturday, September 16, 1978 - University of Minnesota at Duluth - (Duluth area)

As in the past two years, all seventh and eighth grade students who have scored at the 97th percentile or above on a standardized in-grade, in-school mathematics achievement test will be eligible to participate in the Minnesota Math Talent Search. Application forms for the Talent Search will be sent to the schools in August, 1978.

Again, our sincere thanks to you for your support and assistance. The MTYMP has established itself as an exceptional program for students with outstanding mathematical ability. Your help in the creation and maintenance of the MTYMP is appreciated.

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We are looking forward to working with you this coming fall. If you have any questions please contact Lorraine Hertz at 612/296-4072.

Respectfully,

Steven R. Watson per LH

Steven R. Watson, Director
MTYMP

Lorraine Hertz

Lorraine Hertz
Specialist in Gifted Education
Minnesota State Department of Education

SRW:LH:tdh

Minnesota Talented Youth Mathematics Project (MTYMP)
Steven R. Watson - Director
275 North Lexington Parkway
St. Paul, Minnesota 55104

September 30, 1977

To:

Dear Counselor,

Thank you for your referral of the student(s) that you made for the second annual Minnesota Math Talent Search, which was held Saturday, September 10, and Thursday, September 15. The attached list includes the verbal score (number correct out of 50 possible items), the quantitative (math) score (number correct out of 50 possible items), and the total score for the School and College Aptitude Test (SCAT), form 2A, for each one of your students who took the test. Enclosed is the standardized test norms for 9th grade-spring/ 10th grade-fall students. Table #8.

Your cooperation and assistance in making the second Math Talent Search a great success is clearly evident by the 497 seventh and eighth grade students who took the SCAT 2A test. Twenty-eight students scored 43 or better on the math portion of the exam. We feel that that is quite an accomplishment for these youngsters. You should be proud of your students who took the exam. Each student who took the exam, and the students who either qualified for the special fast-paced math class or who are alternates, have all been notified individually, by mail. We suggested to them that they contact you for their scores and an interpretation of those scores.

If you have any questions concerning these scores, please call me, at St. Paul Central High School, 645-9217, Ext. 9.

Respectfully yours,

Steven R. Watson

Steven R. Watson
MTYMP Director

SW/gc

Minnesota Talented Youth Mathematics Project Advisory Committee

Dr. Larry Annet, Curriculum Director, Duluth Public Schools
Dr. Louis Cohen, President, Minnesota Council of Teachers of Mathematics
David Dye, Coordinator of Math Education, Minn. State Department of Education
Themeo Ellis, Principal, Carl Sandburg Junior High, Robbinsdale
William George, Associate Director, Study of Mathematically Precocious Youth, Johns Hopkins University, Baltimore
Lorraine Hertz, Gifted Education Coordinator, Minn. State Department of Education
Dr. Peggy House, Assistant Professor of Math Education, University of Minnesota
Dr. Daniel Keating, Assistant Professor, Institute of Child Development, University of Minnesota
Dr. Harvey Keynes, Math Department, University of Minnesota
Elmer Koch, East Area Math Coordinator, Minneapolis Public Schools
Charles Lund, Math Supervisor, St. Paul Public Schools
Sally Sloan, Computer Resource Teacher, Minneapolis Public Schools
Jan Wahl, Curriculum Committee, St. Paul-Minneapolis Archdiocese
Steven Watson, MTYMP Director

State of Minnesota

Department of Education
Capitol Square, 550 Cedar Street
St. Paul, Minnesota 55101

I give my consent for my son/daughter, _____ (name), to participate in the Minnesota Talented Youth Math Project during 1976-77. I understand that he/she will be expected to attend a weekly mathematics class (to be held at Hamline University) and to complete the mathematics assignments made by the class instructor. The content of this special mathematics class will be equivalent to high school Algebra I and Algebra II.

In addition, I understand that my son/daughter will be expected to complete the following assessments:

a. Mathematics tests and quizzes given by the teacher on a regular basis

b. Nationally standardized tests of Algebra I and Algebra II which will help to determine whether he/she has earned high school credit for the course

c. Assessment of his/her attitude toward mathematics, toward his/her ability to learn mathematics, and toward the special Minnesota Talented Youth Math Class.

This information will enable the project director to evaluate the effectiveness of the MTYMP and to make recommendations for future programs. In addition, I understand that the information resulting from the above evaluations will be kept confidential and that no individual will ever be personally identified in any reports or publications without his/her expressed written consent. However, individual scores or any of the above measures will be available to the student and his/her parents upon request.

Finally, I understand that I am encouraged to ask the project director, the advisory committee members and the instructor any questions I may have about the project of its procedures. Also I understand that I may withdraw my child from the project at any time without prejudice.

Signed _____ Date _____

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State of Minnesota

Department of Education
Capitol Square, 550 Cedar Street
St. Paul, Minnesota 55101

COURSE DESCRIPTION AND RATIONALE FOR SCHOOL YEAR 1977-78

MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT (MTYMP)

During the 1977-78 school year the MTYMP will be offering three accelerated fast-paced math classes. One class will be for a new group of 7th and 8th grade students. This class will follow this year's curriculum of Algebra I and Algebra II, or two years of high school mathematics in one school year. Instead of the regular 350 fifty-minute class periods necessary for mastering Algebra I and Algebra II, the fast-paced math classes will accomplish the same objective because of the ability of the students in 30 two-hour class sessions, from 9/22/77 to 5/18/78.

The other two fast-paced classes will be for the top students from this year's program in the Twin Cities and Duluth metropolitan areas. These two accelerated math classes will teach 1½ years of advanced high school math in one year, or 30 two-hour class sessions from 9/22/77 to 5/18/78. These classes will cover geometry (plane and analytical) normally a one year class, and trigonometry, normally a half year class . This means that a student who successfully participates in the MTYMP during the 1977-78 school year should be ready to take more pre-Calculus courses during the 1978-79 school year.

The question has been asked why should one of this year's MTYMP students participate in the program next year? There are six reasons why the student and his/her parents should seriously consider continuing in the program.

First, next year's fast-paced classes will teach 1½ years of advanced high school mathematics in one year. The student who will have participated in the MTYMP both years will have completed 3½ years of high school mathematics in just two years. The pace of the class will be, as it was this year, accelerated and highly challenging.

Second, the class will be selectively made up of the top mathematics students in the Duluth and Twin Cities metropolitan areas, taken from this year's MTYMP. The level of mathematics taught will be higher, faster, more in depth, and will include various enrichment topics that the regular home school math class cannot offer. These classes will be taught by two of the most competent mathematics instructors in the state of Minnesota. The class will cover more material, in less time, than a regular class. No other math program exists like this in the state, in the private or public schools.

Third, as you know, many junior high schools, and all of the high schools in Minnesota offer a geometry class, and some even offer an enriched plane geometry class. The MTYMP class would avoid the slow pace, the heterogeneous student ability grouping, and the consequent student boredom, that a regular

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math class might hold for the highly gifted mathematics student who has participated in one year of the MTYMP.

Fourth, as many of you have seen this year, the opportunity for a student in the MTYMP to be with other students of equal high ability, and to interact with each other has been of great importance to the academic and social growth of the students. This interaction would continue to be a special advantage to the students in the MTYMP.

Fifth, the acceleration of these math classes will permit students who are interested in mathematics and math related careers to be far ahead of their age group, and that much closer to important long range goal accomplishments.

Last, all of the students in next year's classes would start the program in the fall with the same background, similar mathematics knowledge, and at a very high math achievement level. This is very different from the regular or even enriched home school math classes, and would be even more homogeneous than the first year of MTYMP because this year's students came from various school districts, from three different grade levels, and with a mathematics background that ranged from no Algebra at all to knowledge of the first semester of Algebra I.

These are the basic reasons why a student and his/her parents in the Minnesota Talented Youth Mathematics Project should give careful consideration to continuing in next year's program.

The following is a flow chart for 7th, 8th, and 9th grade students who have participated in the math program during the 1976-77 and would continue to participate during the 1977-78 school year. The description for the 1978-79 school year would be the logical math sequence for the MTYMP student after two years.

Flow Chart

1976-77 - 1st Year	1977-78 - 2nd Year	1978-79 - 3rd Year
7th Grade	8th Grade	9th Grade
Algebra I Algebra II	Plane Geometry Analytical Geometry Trigonometry	Pre-Calculus Math
8th Grade	9th Grade	10th Grade
Algebra I Algebra II	Plane Geometry Analytical Geometry Trigonometry	Pre-Calculus Math
9th Grade	10th Grade	11th Grade
Algebra I Algebra II	Plane Geometry Analytical Geometry Trigonometry	Pre-Calculus Math

Following the 1978-79 school year, these students would be ready to take calculus and higher level college math classes. The value of the fast-paced classes for high ability students is evident from this flow chart. This year's 7th, 8th, and 9th grade students, should they continue in mathematics, would be through Calculus by the end of the 1979-80 school year.

Minnesota Talented Youth Mathematics Project (MTYMP) - Twin City Class Schedule

Hamline University - 1977-1978 School Year

The second year of the Minnesota Talented Youth Mathematics Project (MTYMP) began Saturday, September 10, 1977, at Hamline University, when 294 seventh and eighth grade students participated in the Second Annual Minnesota Math Talent Search. On Thursday, September 15, another 201 students took the Math Talent Search test. The twenty-eight top scorers, out of the 495 Math Talent Search participants, were invited to take part in this year's MTYMP fast-paced classes.

The MTYMP is federally financed, by public law 93:380, and administered by the Minnesota State Department of Education, Gifted Education Department, Lorraine Hertz - Consultant for the Gifted. This year's MTYMP budget was cut more than 14%. I am pleased to state that despite this budget cut, the project will be able to offer the same high level quality classes for high ability mathematics' students.

Last year's entire Duluth class will continue this year. This class will study Plane Geometry, Analytical Geometry, and Trigonometry. In the Twin Cities, last year's two classes have been combined into one class of 22 students. This class will also study Plane Geometry, Analytical Geometry, and Trigonometry. One new class, for 7th and 8th grade students, will offer Algebra I and Algebra II.

The entire MTYMP staff from last year will be back. The staff is:

Ms. Lynn Durward - University of Minnesota-Duluth (Duluth Woodland Jr. High School)	Plane Geometry, Analytical Geometry, and Trigonometry
Ms. Eunice Kanning - Hamline University (Mpls. Central High School)	Plane Geometry, Analytical Geometry, and Trigonometry
Mr. Larry Luck - Hamline University (Mpls. Edison High School)	Algebra I and Algebra II

Mr. Steven Watson - MTYMP Director

Classes begin the week of September 26-29, 1977.
Duluth - Tuesday, September 27, 1977 - 6:30 to 8:30 P.M.
Twin Cities - Thursday, September 29, 1977 - 4:00 to 6:00 P.M.

There will be a total of thirty (30) two-hour classes held this school year.

Twin City (Hamline University) Class Schedule 1977-1978

1.	September 29, 1977	11.	December 22	21.	March 16
2.	October 6	12.	January 12, 1978	22.	March 30
3.	October 13	13.	January 19	23.	April 6
4.	October 27	14.	January 26	24.	April 13
5.	November 3	15.	February 2	25.	April 20
6.	November 10	16.	February 9	26.	April 27
7.	November 17	17.	February 16	27.	May 4
8.	December 1	18.	February 23	28.	May 11
9.	December 8	19.	March 2	29.	May 18
10.	December 15	20.	March 9	30.	May 25, 1978

Classes would not meet during: the MEA-AFT teacher's conventions, Thursday, October 20; Thanksgiving, Thursday, November 24; during winter break, December 23-January 11; or spring break, the week of March 20-24. Classes will again be held at Hamline University, in the Learning Center, at the corner of Snelling and Hewitt Aves., St. Paul, in room 202E (Alg. I and Alg. II), and room 203 E (Geo. and Trig.).

Minnesota State Department of Education
Capitol Square ☐ 550 Cedar Street ☐ St. Paul, Minnesota 55101

MINNESOTA TALENTED YOUTH MATHEMATICS PROGRAM

June 7, 1978

Dear Parents:

Please discuss the following with your son or daughter and return your completed form to Lorraine Hertz by June 20. Your cooperation and assistance are greatly appreciated.

MTYMP Participant: Boy _____ Girl _____

During 1976-77 was in _____ Grade at _____ School

During 1977-78 was at _____ School

1. What mathematics course(s) did you take during 1977-78?

_____

_____

2. What mathematics course(s) do you plan to take during 1978-79?

_____

_____

At what school? _____

3. How would you describe your 1977-78 math course in terms of difficulty? _____

_____

_____

_____

4. How would you describe your 1977-78 math course in terms of interest to you? _____

_____

_____

_____

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5. In what ways was the MTYMP course helpful to you? _____

6. What recommendations would you make to the MTYMP Advisory Committee in planning next year's course? _____

7. In what ways can the MTYMP personnel be most helpful to former students after they leave the MTYMP? _____

8. You are eligible to participate in a second year of the MTYMP. This second year course would cover plane geometry, analytical geometry and trigonometry. Please check your choice below.

_____ (Yes, I am interested in the second year MTYMP course)

_____ (No, I am not interested)

9. Other comments: _____

PLEASE RETURN THIS FORM IN THE ENCLOSED ADDRESS ENVELOPE.

THANK YOU FOR YOUR COOPERATION.

Sincerely,

Steven R. Watson

Steven R. Watson, Director
MTYMP

Lorraine Hertz

Lorraine Hertz
Gifted Education Specialist

SRW:lbn

Appendix D

Progress Reports

MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT

PROGRESS REPORT I

SESSIONS 1 - 10

HAMLINE UNIVERSITY - TWIN CITIES' CLASSES

ALGEBRA I, ALGEBRA II

Name of Student Time Present Times Absent Date

I. Topics Covered

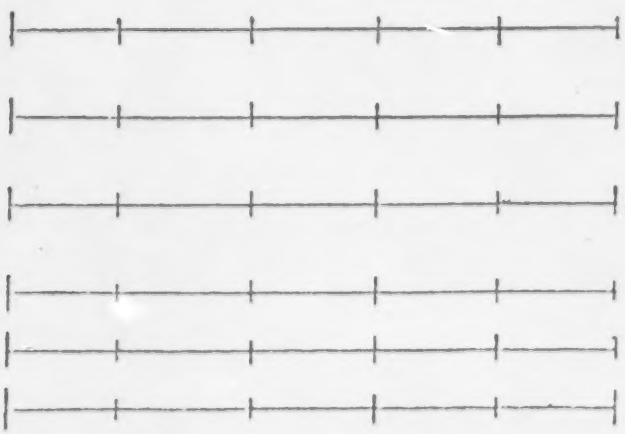
The following topics have been covered from September 29, 1977 through December 16, 1977 (10 class session)

1. simplifying algebraic expressions
2. solving linear equations with one variable
3. solving linear inequalities with one variable
4. simplifying polynomial expressions
5. multiplying binomials
6. factoring polynomials
7. solving quadratic equations without use of quadratic formula
8. graphing lines from equations, two points, and slope-intercept methods
9. finding equations from graphs, two points, and slope-intercept methods
10. functions
11. systems of linear-equations and inequalities

II. Behaviors

The following items represent behaviors that may indicate progress or adjustment over ten class sessions. Due to limited associations value judgment is a big factor, and the results should be viewed as a whole. The items are checked on a continuum.

Never Always



Completes assignments regularly.

Pays attention when material is being presented by the teacher or other students.

Participates regularly in class discussions.

Follows directions.

Appears to be happy.

Appears to be learning.

III. Academic Progress

Examinations	Pass	Unsatisfactory
Homework	Pass	Unsatisfactory
Grade	____	Unsatisfactory

IV. Comments

If you have any comments or questions please call. I will be happy to discuss the evaluation.

Teacher's Signature

Staff

Steve Watson, Director, Central High School, St. Paul, 645-9217
Eunice Kanning, Teacher, Central High School, Minneapolis, 822-3141
Larry Luck, Teacher, Edison High School, Minneapolis, 789-8826
Steve Rosenberg, Teaching Assistant, Minneapolis, 336-0901
Cathy Knapper, Teaching Assistant, Minneapolis, 781-4276

MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT

PROGRESS REPORT II

SESSIONS 11 - 20

HAMLINE UNIVERSITY - TWIN CITIES' CLASSES

ALGEBRA I, ALGEBRA II

Name of Student Time Present Times Absent Date

I. Topics Covered

The following topics have been covered from December 23, 1977 through March 9, 1978 (10 class sessions)

1. solving absolute value relationships with one or two variables
2. solving two equations in two variables by substitution, addition, and graphing
3. solving three equations in three variables by substitution and matrices
4. solving two equations in three variables
5. solving systems of linear inequalities by graphing and finding the extreme points
6. the Pythagorean Theorem
7. operations involving squares, radicals, square roots and simplifying
8. graphing and transforming quadratic functions of the form $f(x)=a(x-h)2+k$
9. solving equations by factoring, completing the square and the quadratic formula
10. using the distance formula
11. solving and graphing equations of conic sections
12. operations with complex numbers
13. solving ratio, proportion, and rational expression problems

Currently we are studying exponential and loganthmic functions. After that we shall be studying trigonometry sequences and series. Time permitting we will be studying probability, matricies and determinants, and circular functions. The last class is scheduled for Thursday, May , 1978.

II. Behaviors

The following items represent behaviors that may indicate progress or adjustment over ten class sessions. Due to limited associations, value judgment is a big factor, and the results should be viewed as a whole. The items are checked on a continuum.

Never Always

_____ Completes assignments regularly.

_____ Pays attention when material is being presented by the teacher or other students.

_____ Participates regularly in class discussions.

_____ Follows directions.

_____ Appears to be happy.

_____ Appears to be learning.

III. Academic Progress

Examinations	Pass	Unsatisfactory
Homework	Pass	Unsatisfactory
Grade	____	Unsatisfactory

IV. Comments

The Minneapolis Public Schools' Minimum Essentials Test for Elementary Algebra-Semester Two was administered for achievement purposes. A score of 36 items correct out of a possible 45 items on that test is considered pass. Your child scored _____ on the test on March 2.

The Cooperative Mathematics Test-Algebra I was administered for achievement purposes. A score of 30 out of 40, 88th percentile on the national norms, is needed to earn credit for Algebra I.

Your child scored _____ correct out of 40 on the test on March 16, 1978.

If you have any comments or questions, please call. The staff has been pleased with the progress of the course and with the cooperation of the students, parents, and home school personnel.

_____
Teacher's Signature

Staff

Steve Watson, Director, Central High School, St. Paul, 645-9217
Eunice Kanning, Teacher, Central High School, Minneapolis, 822-3141
Larry Luck, Teacher, Edison High School, Minneapolis, 789-8826
Steve Rosenberg, Teaching Assistant, Minneapolis, 336-0901
Cathy Knapper, Teaching Assistant, Minneapolis, 781-4276

Minnesota State Department of Education

May 21, 1978

Dear

The Second Minnesota Talented Youth Mathematics Project (MTYMP) concluded classes on Thursday, May 25, 1978. After thirty two-hour classes the 25 outstanding 7th and 8th grade students completed Algebra I and Algebra II. Each student was given the Cooperative Mathematics Test for Algebra I and Algebra II to determine the granting of credit. Under the Minnesota State Department of Education and the MTYMP Advisory Committee guidelines for the program, a student had to score at the 88th percentile or above on the Cooperative examinations for credit in both Algebra courses. One full year of high school mathematics credit is to be granted each course that is completed (total of two years of higher mathematics) to the students upon successful completion of the fast-paced MTYMP classes.

The student(s) scored as follows on the two standardized tests, as given below:

Student Name_____Grade_____

1. Cooperative Mathematics - Algebra I - Test

   _____ correct out of 40 items

   _____ percentile score

2. Cooperative Mathematics - Algebra II - Test

   _____ correct out of 40 items

   _____ percentile score

	Credit earned	Credit not earned	
3.	_____	_____	Algebra I (1 Full Year)
4.	_____	_____	Algebra II (1 Full Year)

On behalf of the students, parents, staff, and advisory committee, we want to thank you for helping to make the second MTYMP a great success. Your help made it possible to offer this accelerated program to the Twin City and Duluth metropolitan areas.

The program has been refunded for next year, 1978-79, and the students from this year's program will continue on to study plane and analytical geometry and trigonometry. Two additional new classes will be offered in the Twin Cities and Duluth for 50 outstanding 7th and 8th grade students. Information about the third Minnesota Mathematics Talent Search will be sent to your school in August.

Again, our thanks to you for your support of the MTYMP.

If you have any questions or need further information, please contact Lorraine Harth at 612-[illegible].

Respectfully,

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Steven R. Watson, Director

AN EQUAL OPPORTUNITY EMPLOYER

Lorraine Harth, Coordinator Education for the Gifted

PROGRESS REPORT I
SESSIONS 1 - 10
HAMLINE UNIVERSITY - TWIN CITIES' CLASSES
GEOMETRY - TRIGONOMETRY

Name of Student Times Present Times Absent Date

I. Topics Covered

The following topics have been covered from September 29, 1977 through December 15, 1977, the first through the tenth session.

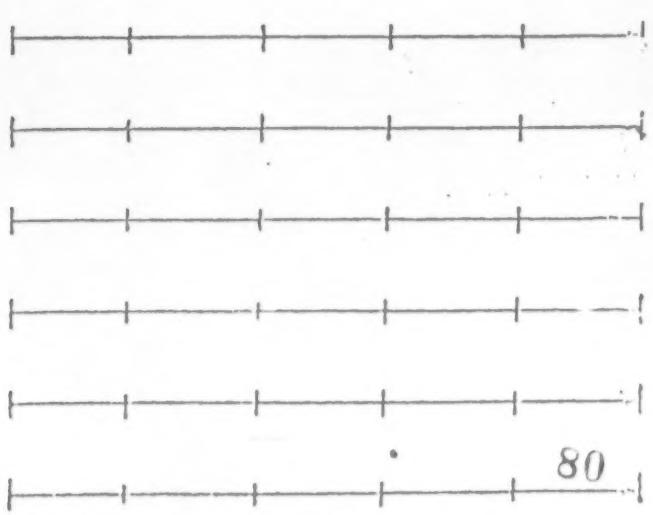
1. introduction to vectors
2. points, lines, and planes
3. angles and segments
4. reflections
5. transformations
6. proof and logic; two column proofs
7. symmetric figures
8. indirection proof
9. proof by induction
10. parallel postulate
11. historical topics
12. regular polygons
13. parallel lines
14. congruent triangles
15. constructions
16. applications of congruent triangles

Currently we are studying classification and identification of congruent triangles and classification of quadrilaterals. Following that we will be studying translations, glides, and similarity. By approximately class 17 we will have completed the usual geometry topics.

II. Behaviors

The following items represent behaviors that may indicate progress or adjustment over nine class sessions. Due to limited associations value judgment is a big factor, and the results should be viewed as a whole. The items are checked on a continuum.

Never Always


Completes assignments regularly.
Paysattention when material is being presented by the teacher or other students.
Participates regularly in class discussion
Follows directions.
Appears to be happy.
Appears to be learning.

III. Academic Progress

Examinations	Pass	Unsatisfactory
Homework	Pass	Unsatisfactory
Grade	_____	Unsatisfactory

IV. Comments

The basic geometry text is Geometry: A Transformation Approach by Arthur Coxford and Zalman P. Usiskin, 1971, Laidlaw.

We are asking that each student present a topic of his/her choice at least once during the course. The topic should be related to geometry, logic, or trigonometry. Topics presented thus far have been on topology and the history of chess.

If you have any comments or questions please call. The staff has been pleased with the progress of the course and with the cooperation of the students, parents, and home school personnel.

_____
Teacher's Signature

Staff

Steve Watson, Director, Central High School, St. Paul, 645-9217
Eunice Kanning, Teacher, Central High School, Mpls., 822-3141
Larry Luck, Teacher, Edison High School, Mpls., 789-8826
Steve Rosenberg, Teaching Assistant, Mpls., 335-0901
Cathy Knapper, Teaching Assistant, Mpls., 781-4276

MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT

PROGRESS REPORT II

SESSIONS 11 - 20

HAMLINE UNIVERSITY - TWIN CITIES' CLASSES

GEOMETRY - TRIGONOMETRY

Name of Student Time Present Times Absent Date

I. Topics Covered

The following topics have been covered from December 22, 1977 through March , 1978, the 11th through the 20th session.

1. applications of similarity
2. size transformation and similarity
3. circles and triangles
4. coordinate geometry
5. area, volume, and perimeter
6. composition and inverse of functions
7. periodic functions
8. circular functions and their graphs
9. properties and circular functions
10. identities and formulas

Currently we are studying application of periodic functions, uniform circular motion, and simple harmonic motion. Following that we will be studying inverses of circular functions, trigonometric functions and their inverses, and solutions of triangles. By February 23, Class 17, the usual geometry topics were completed. On May 2, Class 19, the Coop Standardized Geometry was administered. The results are being processed.

II. Behaviors

The following items represent behaviors that may indicate progress or adjustment over nine class sessions. Due to limited associations, value judgment is a big factor, and the results should be viewed as a whole. The items are checked on a continuum.

Never	Always	
_____		Completes assignments regularly.
_____		Pays attention when material is being presented by the teacher or other students.
_____		Participates regularly in class discussions.
_____		Follows directions.
_____		Appears to be happy.
_____		Appears to be learning.

III. Academic Progress

Examinations	Pass	Unsatisfactory
Homework	Pass	Unsatisfactory
Grade	____	Unsatisfactory

IV. Comments

The basic geometry text is Geometry: A Transformation Approach by Arthur Coxford and Zalman P. Usiskin, 1971, Laidlaw.

The basic trigonometry text is Modern Trigonometry by William Wooton, Edwin F. Beckenbach, Mary P. Dolciani, 1969, Houghton Mifflin.

If you have any comments or questions, please call. The staff has been pleased with the progress of the course and with the cooperation of the students, parents, and home school personnel.

_____
Teacher's Signature

Staff

Steve Watson, Director, Central High School, St. Paul, 645-9217
Eunice Kanning, Teacher, Central High School, Minneapolis, 822-3141
Larry Luck, Teacher, Edison High School, Minneapolis, 789-8826
Steve Rosenberg, Teaching Assistant, Minneapolis, 336-0901

Minnesota State Department of Education
Capitol Square ☐ 550 Cedar Street ☐ St. Paul, Minnesota 55101

June 12, 1978

Dear

The second Minnesota Talent Youth Mathematics Project (MTYMP) successfully concluded classes on Thursday, May 25, 1978. After thirty two-hour classes, the 30 outstanding 8th, 9th, and 10th grade students completed geometry and trigonometry. Each student was given the Cooperative Mathematics Test for Geometry and the Cooperative Mathematics Test for Trigonometry to determine the granting of credit. Under the Minnesota State Department of Education and the MTYMP Advisory Committee Guidelines for the program, a student had to score at the 88th percentile or above on the cooperative examinations to earn credit in geometry and in trigonometry. One full year of high school mathematics credit is to be granted upon the successful completion of the geometry curriculum. One semester (1/2 year) of mathematics is to be granted upon the successful completion of the trigonometry curriculum.

The student scored as follows on the two standardized tests, as given below.

Student Name _____ Grade _____

1. Cooperative Mathematics - Geometry Test, March 2, 1978

   _____ correct out of 80 items

   _____ percentile score

2. Cooperative Mathematics - Trigonometry Test, May 25, 1978

   _____ correct out of 40 items

   _____ percentile score

Credit Earned	Credit Not Earned	
_____	_____	Geometry
_____	_____	Trigonometry

3. Attendance Report 1977-1978

	Times Present	Times Absent
Last 10 weeks	_____	_____
Total for 1977-78	_____	_____

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4. Algebra I (1 full year credit) and Algebra II (1 full year credit) were successfully completed June 2, 1977.

5. MTYMP recommendation for mathematics course of study for school year 1978-79:

_____

_____

_____

Our sincerest congratulations to the outstanding student(s) in your school who performed with such distinction and accomplishment.

The MTYMP has been refunded by HEW for a third year. The Advisory Committee and instructional staff are looking forward to another year of challenge, excitement, and great success for the 1978-79 students who will participate in Minnesota's most unique mathematics program.

Respectfully yours,

Eunice Kanning [pm]

Eunice Kanning
Teacher - MTYMP
(822-3141)

Lynn Durward [pm]

Lynn Durward
Teacher - Duluth MTYMP
(218-525-6289)

Steven Watson [pm]

Steven Watson
Director - MTYMP
(645-9217)

Lorraine Hertz

Lorraine Hertz
State Gifted Consultant
(612-296-4072)

EK:LD:SW:LH:lbn

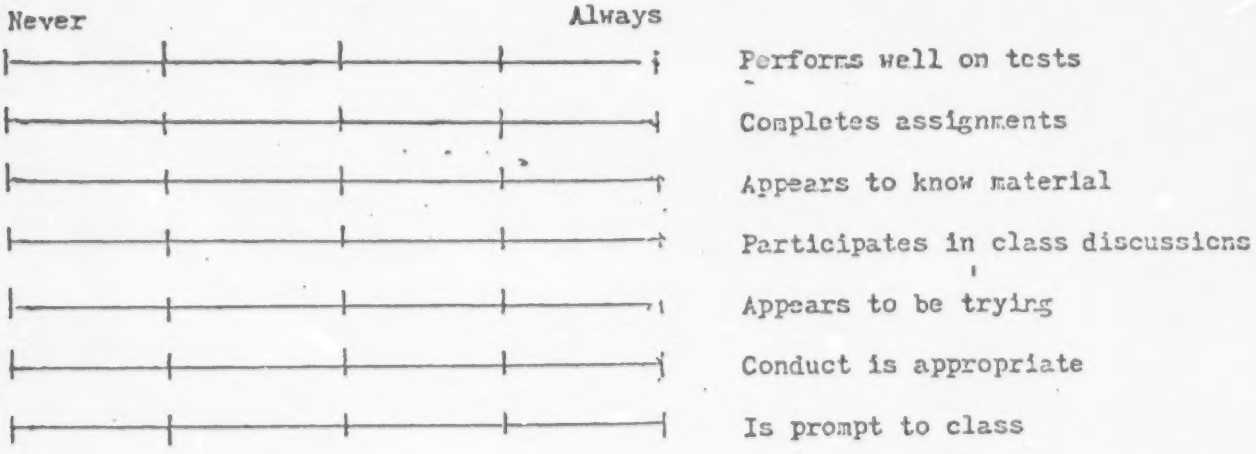
MINNESOTA TALENTED YOUTH MATHEMATICS PROJECT

PROGRESS REPORT OF _____ _____

January 9, 1973

The text book for the geometry part of this class is the Random House Geometry. We have now met for 13 class sessions and will complete the geometry portion by about the 18th class, which is on February 7. The class took the Cooperative Mathematics Geometry Test, Form A, as a pre-test on October 18 and will take Form B as a post test on or about Feb. 7. The student's grade for geometry will be based on his/her performance on this test. The purpose of this progress report is to let you know how I perceive this student's performance so far this year.

The following are the behavioral expectations that the class and I chose to use for evaluation purposes.



Attendance: Times present ____ Times absent ____

Comments:

The following areas of geometry have been covered during the last 13 class sessions:

1. classifying geometric figures
2. similarity and congruence
3. reflectional and rotational symmetry
4. betweeness and angular relations
5. constructions
6. logic and direct and indirect proof
7. congruent triangles
8. parallelism
9. quadrilaterals
10. similar triangles
11. Pythagorean theorem
12. right angle trigonometry
13. coordinate geometry
14. coordinate proof

If you have any comments or questions please feel free to call me anytime. My home phone is 728-4107 and my work phone is 624-5701.

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Lynn Durward

Lynn Durward

Appendix E

Home Schools of MTYMPII Participants

MTYMPII-TC1 Class

School	District	Number of Participants
Anthony Junior High	Minneapolis	3
Capitol View Junior High	Roseville	1
Chippewa Junior High	Mounds View	2
East Junior High	Richfield	1
Fairview Junior High	Roseville	1
Highland Park Junior High	St. Paul	1
Highview Middle School	Mounds View	5
Johanna Junior High	Mounds View	4
Metcalf Junior High	Burnsville	1
Providence School	Archdiocese of St. Paul-Minneapolis	1
Ramsey Junior High	St. Paul	2
Ridgemount Junior High	Wayzata	1
St. Anthony Junior High	St. Anthony	2
St. Luke School	Archdiocese of St. Paul-Minneapolis	1
Sunrise Park Junior High	White Bear Lake	1
Westwood Junior high	St. Louis Park	1

MTYMPII-TC2 Class

School	District	Number of Participants
Abraham Lincoln Senior High	Bloomington	2
Central Middle School	Eden Prairie	2
Columbia Junior High	Columbia Heights	2
Coon Rapids Senior High	Anoka	1
Henry Sibley Senior High	West St. Paul	1
Johanna Junior High	Mounds View	1
Mounds View Senior High	Mounds View	1
Park Senior High	South Washington County	1
Plymouth Junior High	Robbinsdale	1
Richfield Senior High	Richfield	1
St. Paul Academy/ Summit School	Private	1
Westwood Junior High	Spring Lake Park	1

MTYMPII-D2 Class

School	District	Number of Participants
Cathedral High School	Diocese of Duluth	1
Cloquet Junior High	Cloquet	1
Cloquet Senior High	Cloquet	1
East High School	Duluth	1
Esko Schools	Esko	1
Morgan Park Senior High	Duluth	1
Ordean Junior High	Duluth	3
Washington Junior High	Duluth	1
Woodland Junior High	Duluth	4